Essays on Social Contexts for Prosocial Behavior

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Chapter 3 is my single-authored working paper entitled "Heterogeneous Beliefs and Social Information".

Chapter 4 is entitled "Work Motivation and Team Remuneration". The working paper is joint work with Professor Dennis J. Snower, PhD. My contribution to this paper includes the literature review and the analytical solutions to the model. The editorial work and model setup stem from joint efforts.

Chapter 5 is joint work with M.Sc. Simon Bartke. The paper is entitled "When does Team Remuneration Work? An Experimental Study on Interactions between Workplace Contexts". The working paper is provided by the Kiel Institute for the World Economy in its series Kiel Working Papers with number 2105. My contribution to this project has been the underlying intuition, which includes the initial idea and first model framework. The editorial work, experimental design, and data work (data collection and data processing) has been joint effort. The permanent download to the original working

paper is available at:
https://www.ifw-kiel.de/fileadmin/Dateiverwaltung/IfW−Publications/Christiane_Gebuehr/KWP_2105.pdf

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1. Introduction

People are social beings. They are not purely self−interested and self−centered as the narrow concept of *homo economicus* assumes. Overwhelming evidence systematically refutes standard economic assumptions and instead suggests that most people exhibit social preferences (for an overview see, for instance, Fehr and Fischbacher, 2002; Sobel, 2005). A person exhibits social preferences if the person cares about the material well−being, beliefs, or intentions of relevant reference agents. Depending on the circumstances the relevant reference agents can include family members, colleagues, neighbors, friends, and strangers.

The different types of social preferences suggested by economists include, for instance, reciprocity (e.g. Falk and Fischbacher, 2006; Rabin, 1993), inequality aversion (e.g. Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999), altruism (e.g. Andreoni, 1990), and spiteful or envious preferences (e.g. Bolle, 2000; Fehr and Fischbacher, 2002). Economists have developed different models to explain the different facets of social preferences (see, e.g., Akerlof and Kranton, 2000; Bénabou and Tirole, 2011; Camerer et al., 2003; Charness and Rabin, 2002; Fehr and Schmidt, 1999; Rabin, 1993).

Most economic models are not concerned with preference formation and assume that people's preferences are exogenously given. However, preferences are endogenous in the sense that our motivations, values and personalities are shaped by the economic institutions and social interactions people encounter (Bowles, 1998).

Motivational psychologists have proposed different and distinct motives to account for a wide range of social preferences. A motive is commonly defined as a force that gives direction and energy to people's behavior and thereby determines the objective of the behavior, belief and perception of people. Several motives have been identified in the motivational psychology literature including achievement, affiliation, and power (Bosworth et al., 2016). In this framework,

the objective that people pursue depends partly on the stimuli from the social and economic context that people find themselves in.

This dissertation is motivated by the concept of motivational economics that allows preferences to be not only multi−directed, in the sense that people can have different objectives and thus different preferences, but also context−sensitive (Heckhausen and Heckhausen, 2010). The extent to which people are prosocial depends therefore on the social and economic context.

It is therefore important to understand what particular aspects of the social and economic context influence the emergence and development of prosocial behavior. Important contextual aspects that determine the degree to which people behave prosocial include not only incentive structures (e.g. Bandiera et al., 2005; Rotemberg, 1994) but also social group affiliation (e.g. Chen and Li, 2009), social influence and norms (e.g. Cialdini et al., 1990; Cialdini and Goldstein, 2004), formal and informal institutions (e.g. Nee, 1998), non−pecuniary incentives (e.g. Bowles and Polania-Reyes, 2012), team synergies (e.g. Chao and Croson, 2013; Wageman and Baker, 1997), or frames and narratives (e.g. Akerlof and Snower, 2016; Tversky and Kahneman, 1981).

This thesis is concerned with two different and distinct aspects of the social and economic context that are important for prosocial and cooperative behavior. The first aspect studied in chapter 2 and chapter 3 is social information. Social information refers to information about the behavior of others, for example, observing how others surrounding oneself behave in a given situation. Both chapters provide not only evidence for the effect of social information on prosocial behavior but furthermore show how prosocial behavior depends on how information is presented to people and their own initial beliefs.

The other aspect of social context considered in chapter 3 and 4 of this dissertation is the interplay between interdependent reward structures and team synergies for cooperative behavior at the workplace.[1] The former refers to, for example, team incentives like profit-sharing plans whereas team synergies describe a production function that depends not only on people's own efforts, but on others' efforts as well (Alchian and Demsetz, 1972; Chao and Croson, 2013). Both chapters provide evidence that aligning these two elements to create a cooperative workplace context motivates increased cooperation among co-workers.

[1] In this dissertation the terms team synergy and complementarity in production are used synonymously.

Chapter 2 presents the results of a field experiment that investigates charitable giving. People are asked to guess a descriptive norm before receiving it. We show that receiving the social information increases donations compared to people that do not receive any additional information. We further find that guessing the descriptive norm before receiving the social information significantly increases donations compared to only receiving the social information. We argue that social information can increase prosocial behavior and that the effectiveness of social information depends on the salience of the norm.

Chapter 3 analyzes the influence of heterogeneous beliefs when people are presented with social information on donations. In a laboratory experiment, people are anonymously asked to donate a share of a fixed amount of money to a charity. Depending on the treatment, people are presented with social information about the average donation of four other people that have previously participated in the experiment. I do not find any treatment effects on distributional preferences. I find that people adjust their empirical and normative beliefs towards the social information. Empirical beliefs refer to what people think how others behave. Normative beliefs refer to what others belief should be done. Personal normative beliefs are less affected by social information. Personal normative beliefs refer to what people themselves believe should be done. I show that initial differences in empirical beliefs can cause heterogeneous treatment effects in donation choices. People adjust their donation choices towards the social information provided. In addition, I provide evidence that personal normative beliefs, which are less affected by social information, remain important to explain donation behavior. I conclude that social information affects prosocial behavior, but that it depends crucially on people's initial beliefs. The heterogeneity of initial beliefs can potentially explain the mixed results of social information on distributional preferences.

Chapter 4 and chapter 5 study the interplay between interdependent reward structures and team synergies for cooperative behavior at the workplace. Chapter 4 uses a simple theoretical principle−two agent framework to present a novel approach of multi−directed work motivation that explains the prevalence of team remuneration despite the free rider problem. In this simple model, agents are recognized to have one of two different psychological motives, each associated with a different objective. The self−interested wanting motive leads agents to maximize their selfish interest; whereas the caring motive leads them to maximize a weighted average of joint payoffs of the two

agents. Which motive is active depends on the work environment, particularly the remuneration scheme and the degree of team synergy. Conditions under which individual performance remuneration activates the self−interested wanting motive and team remuneration activated the caring motive are derived. The analysis explains the condition under which team remuneration can promote productivity and profitability, namely, through the induction of a motivational shift.

Finally, the last chapter of this thesis, chapter 5, uses a laboratory experiment to analyze how workplace cooperation depends on the interactions of varying degrees of team synergy and different remuneration schemes. The design of the experiment is based on the theoretical model from chapter 4. One major difference between the model in chapter 4 and the design of the experiment in chapter 5 is that all participants participate in a novel team building exercise at the beginning of the experiment. The study finds that participants exert more effort under team remuneration than under individual remuneration when team synergies are high. A more in−depth analysis shows that beliefs and personal values can only partly explain cooperative behavior. The paper concludes that preferences are partly context−dependent and different contextual elements, in particular the incentive structure and the degree of team synergy in combination with the team building exercise, interact to explain cooperative behavior and the use of team incentives within organizations.

2. Social Comparison Nudges - Guessing the Norm Increases Charitable Giving

The paper "Social comparison nudges - guessing the norm increases charitable giving" is joint work with Simon Bartke, Andreas Friedl, and Laura Reh. This paper has been published in Economics Letters, volume 152, March 2017, pages 73-75. The journal article is available at:
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3. Social Information and the Role of Heterogeneous Beliefs

3.1 Introduction

This paper presents a laboratory experiment on the role of heterogeneous beliefs for distributional preferences when presented with social information. Social information informs individuals about the behavior of others in similar situations and affects choices in different domains including career choices (Coffman et al., 2017), political participation (Bischoff and Egbert, 2013; Margetts et al., 2011) and financial decisions (Bursztyn et al., 2014). The effect of social information on distributional preferences, however, is ambiguous.

On the one hand, several lab and field experiments find that social information increases charitable contributions (Bartke et al., 2017; Frey and Meier, 2004; Krupka and Weber, 2009; Martin and Randal, 2008; Shang and Croson, 2009; Smith et al., 2015). Krupka and Weber (2009) find that the degree of prosocial behavior is increasing in the observed prosocial behavior of others. Croson and Shang (2008) find that respondents of fundraising campaigns of a public radio station change their charitable contribution in the direction of another donor's contribution. Furthermore, the downward impact of downward social information is stronger than the upward impact of upward social information (see also Dimant et al., 2017).

On the other hand, the seminal paper by Frey and Meier (2004) finds no significant difference in students' contributions to a charity fund between low social information (i.e. students are informed that 46 percent of other students donated) and high social information (i.e. students are informed that 64 percent of other students donated) when simply comparing averages. They argue that this is potentially due to individuals' heterogeneous preferences. Individuals that always or never donate are less affected by social information. Similarly,

Iriberri and Rey-Biel (2013) and Cason and Mui (1998) find that individuals that initially choose the self-payoff maximizing choice in a repeated (modified) dictator game are significantly less affected by social information. Shang and Croson (2009) demonstrate that a positive social information effect for a fundraising campaign of a public radio station is only significant for new members but not for renewing members. In a replication study with renewing members, Murphy et al. (2015) find no evidence that social information significantly affects donations. Raihani and McAuliffe (2014) find no significant effect of social information on contributions in an online dictator game. Finally, Sanders (2017) finds no effect on donations in a field experiment at the workplace when workers are informed that 7.5% of their colleagues have donated.

This paper is motivated by the fact that not only individuals' distributional preferences but also their beliefs about other's decisions are heterogeneously distributed (Bardsley, 2008; Iriberri and Rey-Biel, 2013). Depending on individuals' initial beliefs, social information changes what individuals belief about others' behavior. For example, within a repeated public good game, Fischbacher and Gachter (2010) describe individuals' belief formation as a partial adjustment of their initial beliefs towards the direction of the social information provided which is their group members' contribution in previous rounds. Beliefs are thus a weighted average of observed social information and individuals' own previous beliefs. Since individuals' beliefs often inform their own subsequent decisions (Brañas-Garza and Rodriguez-Lara, 2014; Brañas-Garza et al., 2014; Croson et al., 2009; Frey and Meier, 2004; Molnár et al., 2016), I argue that simple measurements of aggregate decisions are insufficient and heterogeneous beliefs need to be taken into consideration when studying the effect of social information on distributional preferences.

Most studies on belief elicitation allow for strategic interactions.[1] However, nonstrategic settings are ideal to study the role of individuals' beliefs and social information for distributional preferences (Iriberri and Rey-Biel, 2013). To the best of my knowledge, only a limited number of studies studied how decisions- after individuals' were provided with social information- depend on individuals' initial beliefs in a non−strategic setting (Bekkers, 2012; Cason and Mui, 1998; Iriberri and Rey-Biel, 2013). Iriberri and Rey-Biel (2013), for ex-

[1]For an overview on belief elicitation see, for instance, Schotter and Trevino (2014).

ample, use a modified dictator game to study the importance of different types of distributional preferences and their beliefs about others' distributional preferences when providing social information. They show that individuals hold not only heterogeneous beliefs but that their beliefs significantly affect charitable contributions.

One reason for why individuals follow social information is because it informs them about the norm, i.e. what constitutes socially appropriate behavior (Andrighetto et al., 2015; Zafar, 2011). Especially research in psychology has shown that individuals are socially influenced to do what they believe others who are similar to them would do in a similar situation (Cialdini et al., 1991; Cialdini and Goldstein, 2004; Deutsch and Gerard, 1955; Zafar, 2011).[2] For example, individuals' charity contributions are influenced by their empirical beliefs about others' donations (Bicchieri, 2006; Croson and Shang, 2008). These empirical beliefs refer to how individuals tent to behave− their average or typical behavior− and are often grounded in previous observations, knowledge or projections as when they think their behavior is representative of how most other individuals would behave (Bicchieri and Xiao, 2009).

Besides empirical beliefs, individuals hold injunctive beliefs. Injunctive beliefs serve as a standard or guide for appropriate behavior (Anderson and Dunning, 2014; Bicchieri, 2006; Sugden, 1998). Both types of injunctive beliefs− normative and personal normative beliefs− are not descriptive but normative in nature because they refer to what should be done (even when individuals do not necessarily behave accordingly). Normative beliefs refer to what individuals' belief others think how one ought to behave. Bicchieri (2006) argues that normative beliefs are important for norm compliance because they provide a perceived legitimacy by accepting what one is normatively expected to do by others (see also Andrighetto et al., 2015).

It is important to distinguish these second−order normative beliefs from personal normative beliefs. The latter refer to individuals' beliefs regarding what ought to be done in a given situation irrespective of what others do or think ought to be done. Individuals are motivated to follow personal normative beliefs by their desire to act consistently with their own values in order to enhance or preserve their sense of self−worth and avoid self−concept distress

[2]Social influence differs from other-regarding preferences. For example, a person with fairness preferences should not be influenced by information pointing to other individuals' contrary beliefs or behavior.

(Schwartz, 1977).

Psychologists in particular have shown the importance of personal normative beliefs for decision making (Bicchieri and Xiao, 2009; Corral-Verdugo and Frías-Armenta, 2006; Schwartz, 1977). Individuals with strong personal normative beliefs would be expected to behave relatively independent of what they believe to be socially appropriate behavior. For example, individuals' donations to charity would be unconditional or less sensitive to new information about how much others have contributed or how much they belief should be contributed.

In this paper, individuals are asked to divide a fix amount of money between themselves and a charity. Before their donation, they are provided with information about the average donation of four other participants. I study downward and upward social information pressure by providing individuals with one of two diametrical types of social information (Croson and Shang, 2008; Shang and Croson, 2009). Individuals receive social information which is either higher or lower compared to average donations without any social information. Furthermore, I elicit all three types of individuals' beliefs at the beginning of the experiment and after social information is provided and the distributional choice is made.

I find that a majority of individuals update their empirical and normative beliefs towards the social information whereas personal normative beliefs are less affected. On average, I do not find a significant influence of social information on donations. A more thorough analysis shows that this is partly due to heterogeneous treatment effects. Individuals with initially high empirical beliefs decrease their donation while individuals with initially low empirical beliefs increase their donations compared to the baseline treatment without any social information. Personal normative beliefs which are less affected by social information partly explain differences in donations. My results indicate that all three types of beliefs are important to understand when providing social information for distributional preferences. The effectiveness of social information depends crucially on individuals' initial empirical and personal normative beliefs.

3.2 Design

in order to determine the distributional preferences each participant was endowed with 9€ and asked to divide the money between themselves and a charity. The default charity was the German Red Cross which is one of the most well-known charities in Germany.[3] Participants were previously informed that they could choose to donate to another charity after their donation choice. If no other charity was chosen or the stated charity did not exist, the default German Red Cross charity was selected.[4] This was communicated to the participants before their donation choice. A translation of the instructions can be found in the appendix. All participants were informed that any donation would occur anonymously. Participants donated to charity instead of an anonymous recipient as in the standard dictator game to avoid heterogeneous treatment effects through beliefs about the recipient. In addition, potential fairness or social image concerns are less relevant when donating anonymously to a charity than to another participant.

At the beginning of the experiment, participants' initial empirical, normative, and personal normative beliefs were elicited. Participants' updated empirical, normative, and personal normative beliefs were elicited after the donation choice. Empirical beliefs were elicited by asking participants how much of the 9€ they believe are donated on average. Normative beliefs refer to individuals' beliefs regarding what others think one ought to do. To elicit these beliefs, participants were first asked their personal normative beliefs of how much they belief should be donated to charity. Then, participants were asked how much they believed other participants answered should be donated on average. The order of empirical beliefs and (personal) normative beliefs were randomized. Empirical and normative beliefs were incentivized. Participants could gain an additional 1€ for making a guess within a 1€ margin compared to a pilot group with 16 subjects. Before the updated beliefs elicitation, participants were informed that either their initial or updated beliefs were selected to be incentivized. This was done to prevent strategic considerations, for instance,

[3]The German Red Cross includes around 2.9 million sustaining members, 425.000 volunteers, and 164.000 full-time employees (German Red Cross, 2017). Reasons for choosing the Red Cross are also discussed in Zafar (2011).

[4]To be a valid charity, the stated charity needed to be listed as a charity by the "German Central Institute for Social Issues".

hedging strategies by stating different values. Participants were reminded of their initial beliefs when entering their updated beliefs. Changes in beliefs are therefore not the result of participants forgetting or misremembering their initially stated beliefs.

My experiment consists of three treatments. Treatments differ only in the social information provided to the participants after their initial belief elicitation and before their donation choice. In the baseline treatment (Baseline), no additional information was provided to the participants. In the other two treatments, participants received information about the average donation choice of four other participants who were asked to divide 9€ between themselves and a charity of their choice in a previous pilot session. Group formation in the pilot session was randomized. In the low social information treatment (Low Info) participants were informed that a group of four other participants donated on average 2.4€. In the high social information treatment (High Info) participants were informed that a group of four other participants donated on average 4.1€. Participants in both social information treatments had to enter the correct social information before the donation choice. This ensured that all participants acknowledged the social information.

The values for the social information treatments were selected such that one social information treatment was below and the other social information treatment was above the mean donation of the pilot session (3.3€). The distance from the mean donation choice of the pilot session was almost identical in both social information treatments.

Note that the participants were not being deceived. Similar to Frey and Meier (2004) and Bicchieri and Xiao (2009) social information was based on actual previous behavior. It was clearly communicated to the participants that the average donation choice presented was based on a group of four other participants and it was nowhere stated that the social information was random or representative.

Seven experimental sessions were conducted in the Experimental Laboratory of the Kiel University using z-Tree experimental software (Fischbacher, 2007). In total, 115 subjects (57 females) participated in the experiment that lasted about 30 minutes. Participants earned on average around 6€. Before the actual experiment each participant drew a random number. This number was used to ensure participants (payoff) anonymity. A research assistant that did not have any contact with the participants prepared the participants' final

payments in sealed envelopes based only on the randomly drawn number. The experimenter distributed the numbered envelopes without knowing how much money was in the sealed envelopes. This procedure was explained to the participants in the instructions.

3.3 Hypotheses

If individuals belief that the presented social information is useful to them, they may choose to update their empirical beliefs, i.e. what they belief how others behave, towards the social information. However, individuals may differ to the extent to which they consider the presented social information relevant. Given that the social information in my design is the average of only four other individuals; individuals might perceive it as non-representative or non-informative. In that case, they would simply neglect the social information and not update their initial beliefs.
Social information might also alter normative beliefs (Bicchieri and Xiao, 2009). For example, individuals that are told that other individuals have behaved more (less) selfish than they previously believed, might then assume that those individuals also consider more (less) selfish behavior appropriate. Individuals that regard the social information as useful might therefore update both empirical and normative beliefs towards the social information. Personal normative beliefs refer to individuals' own beliefs about what should be done under certain circumstances. Since social information provides individuals only with descriptive information about the behavior of others, it is reasonable to assume that personal normative beliefs are not affected by social information.

The Beliefs Adjustment Hypothesis: *Empirical and normative beliefs are updated towards the social information. Social information lower (higher) than individuals' initial stated values of empirical and normative beliefs results in a decrease (increase) of stated values of empirical and normative beliefs. Social information does not affect individuals' personal normative beliefs.*

Individuals' initial beliefs and choices are often closely linked in strategic and non-strategic interactions (Andrighetto et al., 2015). Irrespective of any social information, own initial beliefs remain important for belief formation and choices (Fischbacher and Gachter, 2010). This is particularly true when so-

cial information is based on a small non-representative sample. For example, low stated values of empirical and normative beliefs might be indicative that the individual is more interested in their own material payoff irrespective of the behavior of others. Social information that contradicts these beliefs could potentially lead individuals to update their beliefs, while choices remain unchanged.

The Initial Beliefs Dependence Hypothesis: *Individuals with more (less) self-regarding initial empirical and normative beliefs donate less (more) irrespective of the social information provided.*

I hypothesize that individuals are expected to update their empirical and normative beliefs towards the provided social information when the presented information is indicative of how others actually behave. If updated empirical beliefs influence individuals' choices then heterogeneity in initial empirical beliefs can cause heterogeneous treatment effects. Compared to individuals that do not receive any social information, individuals in the social information treatments donate more or less depending on their initial empirical beliefs.

The Donation Adjustment hypothesis: *Social information lower (higher) than empirical beliefs results in individuals donating less (more) than without any social information.*

Different from empirical and normative beliefs, individual's personal normative beliefs correspond to what they personally believe to be socially appropriate behavior. Even when individuals update their empirical beliefs because of additional social information, donations could partly be driven by personal normative beliefs. For example, individuals that follow primarily their personal normative beliefs might update their empirical and normative beliefs but still behave at least partly in accordance with their personal normative beliefs.

The Personal Belief Hypothesis: *Individuals with higher (lower) stated values of personal normative beliefs donate more (less) irrespective of the social information provided.*

3.4 Results

3.4.1 Beliefs and Social Information

Table 3.1 presents descriptive statistics. Note first that initial empirical, normative, and personal normative beliefs are insignificantly different across treatments (Kruskal-Wallis (K-W) p-values > 0.29 for all three belief types). Across all individuals, initial empirical beliefs average 2.83€, initial normative beliefs average 3.39€ and initial personal normative beliefs average 3.54€. Initial empirical beliefs are significantly lower than both normative beliefs and personal normative beliefs across all treatments (pairwise t-test p-values < 0.07 for all comparisons). I do not find any significant difference between normative beliefs and personal normative beliefs (t-test p-values > 0.28 for all treatments). These results indicate that prior to social information provision, individuals belief that others donate significantly less than both what they personally belief should be donated and what they belief others state should be donated.

		Treatments		
		Baseline (No soc. info.)	Low Info (2.4€soc. info.)	High Info (4.1€soc. info.)
Number of Participants		29	44	42
Mean Donation		3.29	3.05	3.18
		(0.47)	(0.35)	(0.30)
Mean Empirical Beliefs	Initial Belief	2.62	2.68	3.10
		(0.30)	(0.23)	(0.24)
	Updated Belief	2.72	2.52	3.47
		(0.32)	(0.15)	(0.17)
Mean Normative Beliefs	Initial Belief	3.33	3.28	3.56
		(0.34)	(0.28)	(0.29)
	Updated Belief	3.32	3.06	3.76
		(0.34)	(0.21)	(0.19)
Mean Personal Norm. Beliefs	Initial Belief	3.61	3.49	3.54
		(0.38)	(0.32)	(0.28)
	Updated Belief	3.43	3.38	3.67
		(0.38)	(0.29)	(0.26)

Table 3.1: Descriptive statistics of donations and beliefs. Standard deviations in parentheses. Means refer to the average amount donated or belief stated between 0€ and 9€.

Updated empirical beliefs and updated normative beliefs differ significantly across treatments (K-W p-value < 0.01 for both beliefs), while personal normative beliefs are insignificantly different across treatments (K-W p-value > 0.23). Updated personal normative beliefs average 3.50€ across all individuals which is insignificantly different from initial personal normative beliefs (3.53€ and t-test p-value>0.25 across all treatments) indicating that on average social information does not affect personal normative beliefs.

I find that updated empirical beliefs are significantly higher in the high info treatment (average of 3.47€) compared to low info treatment (average of 2.52€ and t-test p-value < 0.01) and baseline treatment (average of 2.76€ and t-test p-value < 0.04). Although updated empirical beliefs decline in the low info treatment I find no significant difference compared to the baseline treatment (t-test p-value > 0.45). Updated normative beliefs are significantly higher in the high info treatment (average of 3.76€) compared to the low info treatment (average of 3.07€ and t-test p-value < 0.02). I find no significant difference between the high info treatment and baseline treatment (average of 3.32€ and t-test p-value>0.22). Although normative beliefs decline in the low info treatment I find no significant difference compared to the baseline treatment (t-test p-value > 0.49). On average, high (low) social information increases (decreases) individuals' empirical and -to a lesser extent- normative beliefs.

Updated empirical beliefs are significantly lower than updated normative beliefs (t-test p-value < 0.08 for all treatments). Updated empirical beliefs are also significantly lower than updated personal normative beliefs in the baseline treatment (t-test p-value < 0.04) and low info treatment (t-test p-value < 0.01) but not in the high info treatment (t-test p-value > 0.36). Under high social information empirical beliefs converge towards personal normative beliefs. I find no significant difference between updated normative beliefs and updated personal normative beliefs (t-test p-value > 0.10 for all treatments).

While personal normative beliefs are not affected by social information, I find significant treatment differences for both empirical and normative beliefs. This effect seems more pronounced in the high info treatment than in the low info treatment. One explanation is that on average individuals' initial empirical beliefs (2.83€) are closer to the low social information of 2.4€ than the high social information of 4.1€. Therefore, individuals in the low info treatment update their beliefs less.

Table 3.2 depicts the frequencies of individuals in the two social information

treatments that either change their beliefs towards the social information or do not change their beliefs. In both social information treatments, a majority of individuals change their initial empirical beliefs towards the social information (in total 53 out of 86 individuals). This means that most individuals with initial empirical beliefs below the social information increase their empirical beliefs after their donation choice, whereas individuals with initial empirical beliefs above the social information decrease their empirical beliefs after their donation choice. In the low info treatment 14 out of 44 individuals and in the high info treatment 15 out of 42 individuals do not change their empirical beliefs. Only 4 out of 86 individuals update their empirical beliefs away from the social information provided.

Similarly, most individuals updated their normative beliefs towards the social information (in total, 47 out of 86 individuals). In the low social information treatment, 20 out of 44 and in the high social information treatment 15 out of 42 do not change their normative beliefs. Across both social information treatments only 4 out of 86 individuals change their normative beliefs away from the social information.

A minority of 28 out of 86 individuals (15 out of 44 individuals in the low info treatment; 13 out of 42 individuals in the high info treatment) change their personal normative beliefs towards the social information. Only 3 of 86 individuals change their personal normative beliefs away from the social information.[5]

Overall, social information about the behavior of other individuals changes empirical and normative beliefs of a majority of individuals. This is in line with Bicchieri and Xiao (2009) who also find a close correlation between empirical and normative beliefs. These results support my belief adjustment hypothesis. However, it is important to note that a significant share of individuals remain with unchanged beliefs. This is particularly true for personal normative beliefs. Only a minority of individuals changes what they consider to be socially appropriate (i.e. what should be done) when presented with information about the behavior of others.

[5]Supportive evidence for these results by means of a multivariate logit regression for the decision to decrease or increase empirical beliefs, normative beliefs and personal normative beliefs can be found in the appendix.

		Social Information Treatment	
		Low Info (N=44)	High Info (N=42)
Empirical Beliefs	Lower than Soc Info	13inc; 7no (n=21)	21inc; 11no (n=34)
	Higher than Soc Info	15dec; 7no (n=23)	4dec; 4no (n=8)
Normative Beliefs	Lower than Soc Info	9inc; 4no (n=14)	15inc; 8no (n=25)
	Higher than Soc Info	13dec; 16no (n=30)	10dec; 7no (n=17)
Personal Normative Beliefs	Lower than Soc Info	6inc; 9no (n=16)	10inc; 14no (N=25)
	Higher than Soc Info	9dec; 18no (n=28)	3dec; 14no (n=17)

Table 3.2: Frequencies of belief changes towards social information. For each belief type, individuals are categorized by their initial belief being lower or higher than the social information. No individual stated an initial belief equal to the social information. "inc" ("dec") indicates the number of participants that increased (decreased) the value stated in the updated belief elicitation compared to the initial belief elicitation. "no" indicates the number of individuals that did not change the corresponding belief. "N" is the total number of participants in each treatment and "n" the number of participants within each treatment with beliefs lower/higher than the social information.

3.4.2 Heterogeneous Beliefs and Donation Choices

On average, individuals donate 3.16€ out of the 9€ provided across all treatments (baseline treatment 3.29€, low info treatment 3.05€, and high info treatment 3.18€). Donations are insignificantly different across treatments (K-W p-value > 0.78). Different from previous social information studies, I find that neither social information below nor above average donations in the baseline treatment affects average donations significantly.

Given the heterogeneity of empirical beliefs, the question rises as to whether social information affects donations differently depending on individuals' initial empirical beliefs. In order to account for belief heterogeneity, individuals are divided into one of three groups. The three groups consists of individuals with initial empirical beliefs lower than the low social information (lowbelief), initial empirical beliefs between the low social information and the high social information (medbelief), and individuals with initial empirical beliefs higher than the high social information (highbelief).

Table 3.3 illustrates two OLS regressions with donations in Euro as the dependent variable. I include two dummy variables for the low info (lowinfo) and high info (highinfo) treatments, respectively. In the first model, I include the medbelief and highbelief dummies with lowbelief being the left out category.

In the second model, I include the lowbelief and medbelief dummies with highbelief being the left out category. In both models, I add interaction variables between individuals' belief groups and treatment dummies.
In the first model, the two belief group dummies- medbelief and highbelief- are highly significant and positive. The highbelief dummy is significantly higher than the medbelief dummy (coefficient F-test p-value < 0.01). In line with previous studies, individuals with higher initial empirical beliefs donate more. The interaction variables between individuals' belief group and treatment dummies describe how the effect of social information depends on individuals initial empirical beliefs. I find that in the low info treatment individuals with medbelief or highbelief donate significantly less compared to the left out baseline treatment. In the high info treatment individuals with higher empirical beliefs than the social information (highbelief) donated significantly less compared to the baseline treatment. I do not find any significant interaction effect for the medbelief group in the high info treatment. When initial empirical beliefs are higher than the social information provided individuals decrease donations compared to the baseline treatment.
Similar results are found when I use the highbelief group as the base category. Individuals in the two belief groups- lowbelief and medbelief- donate significantly less compared to the base category. The interaction variables for the lowbelief group and the treatment dummies as well as for the medbelief group and high info treatment are significant. I do not find any significant interaction effect for the medbelief group in the low info treatment. Individuals with initial empirical beliefs lower than the social information donate significantly more compared to the baseline treatment.
These results provide supportive evidence for the initial beliefs dependence hypothesis and the donation adjustment hypothesis. The latter refers to the heterogeneous treatment effect in donations similar to the so-called boomerang effect (Clee and Wicklund, 1980). To the best of my knowledge, this is the first study that provides compelling evidence for such heterogeneous treatment effects not based on previous decisions but on individuals' initial empirical beliefs.

OLS Specifications (DV: Donations in Euro)	(1)	(2)
lowinfo	0.6	-1.54
	(0.6)	(1.03)
highinfo	0.36	-2.71***
	(0.64)	(1.03)
lowbelief		-5.40***
		(0.92)
medbelief	2.38***	-3.03***
	(0.78)	(1.03)
highbelief	5.40***	
	(0.92)	
lowinfo*lowbelief		2.13*
		(1.19)
highinfo*lowbelief		3.07**
		(1.21)
lowinfo*medbelief	-1.90*	0.24
	(0.99)	(1.3)
highinfo*medbelief	-0.8	2.27*
	(1.00)	(1.28)
lowinfo*highbelief	-2.13*	
	(1.19)	
highinfo*highbelief	-3.07**	
	(1.21)	
constant	1.70***	7.10***
	(0.45)	(0.81)
Observations	115	115
Adj. R^2	0.34	0.34

Table 3.3: OLS regressions on donations with three empirical belief groups. Standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01. All independent variables are dummy variables.

Next, I analyze the importance of personal normative beliefs for donation choices. Of particular interest is the importance of personal normative beliefs when they differ from individuals' updated empirical beliefs. For example, individuals might update their empirical beliefs due to social information while holding their personal normative beliefs constant.

OLS Specifications (DV: Donations in Euro)		
	(3)	(4)
lowinfo		-0.85
		-0.55
highinfo		-0.39
		-0.53
belief difference	0.43***	-0.17
	-0.13	-0.24
lowinfo* belief difference		0.75**
		-0.33
highinfo * belief difference		1.03***
		-0.33
constant	2.91***	3.40***
	-0.21	-0.42
Observations	115	115
Adj. R^2	0.08	0.13

Table 3.4: OLS regressions on donations with difference between updated personal normative and updated empirical beliefs. Standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 3.4 illustrates two OLS regressions to identify whether the difference between individuals' updated personal normative beliefs and updated empirical beliefs (belief difference) affects donations. In model three I only include belief difference as independent variable. I find that donations increase when updated personal normative beliefs increase compared to updated empirical beliefs.[6]

[6]This result is robust to different belief groups. An OLS regression as in table 3.3 that includes personal normative beliefs can be found in the appendix.

In model four from table 3.4 I add treatment dummies (lowinfo and highinfo) and interaction variables between the treatment dummies and the belief difference variable. For the baseline treatment I do not find any significant effect of belief difference. One possible explanation is simply that without any social information individuals' empirical beliefs and personal normative beliefs are aligned. Individuals with high empirical beliefs also have high personal normative beliefs and donate more than individuals with low empirical beliefs and low personal normative beliefs. For both interaction effects I find that individuals with a higher belief difference donate significantly more. Most individuals update their empirical beliefs when presented with social information which influences their donation choices. However, these regressions indicate that personal normative beliefs are also important. Some individuals might be less motivated to behave consistent with what they believe to be socially appropriate behavior and more in accordance with their own inherent values.

3.5 Conclusion

The laboratory experiment of this study uses the observed heterogeneity in empirical beliefs to explain the effects of social information on distributional preferences. When presented with social information, a majority of individuals change their empirical and normative beliefs towards the social information, while only a minority changes their personal normative beliefs. On average, I do not find any significant difference in donations across treatments. I find, however, that the effect of social information depends on individuals' initial empirical beliefs. This causes heterogeneous treatment effects. Individuals with higher (lower) initial beliefs than the social information reduce (increase) their donations when presented with social information.

Most studies on social information only consider aggregate effects and neglect such heterogeneous treatment effects. Effective policies or nudges based on social information could potentially include not only previous decisions but be designed to consider individuals' empirical and normative beliefs. These additional measurements can potentially increase the effectiveness of such policies. I further find that personal normative beliefs remain important to explain donations. The interplay between personal normative beliefs and empirical beliefs are especially relevant when social information alters individuals' beliefs about how others behave. Even when individuals internalize the social

information presented and updated their empirical and normative beliefs accordingly their decisions might depend on their personal normative beliefs, i.e. what they personally belief should be done. These findings could potentially explain the mixed results of the effect of social information on distributional preferences. Studies on social influence need further understanding of which belief types are important, how individuals weight different belief types, and how they interact with each other.

3.6 Appendix A

3.6.1 A1. Instructions and Experimental Script

This is a translation of the experimental instructions which were handed to all participants and read aloud. I also include the instructions that were displayed on the monitor of the participants after the experiment began.

Instructions read to all participants

Welcome to today's study. Please read along while the instructions are being read out to you. Please do not talk to other participants. If you have a question, please raise your hand quietly. A scientific assistant will come to you and answer your question in private. During the study you will make decisions which have financial consequences for you. The identities of all participants will not be revealed during today's study. You will make all your decisions on the Computer. Please enter decimal numbers with a point and not with a comma.
In what follows you will receive 9.00€. This amount can be allocated between yourself and a charity. The allocation occurs in 1 Cent increments. You are free to allocate the amount how you wish. After your allocation decision you are free to select a specific charity for which you want to donate. Any donations to the selected charity occur anonymously. If you enter a charity that is not in the charity list by the German Central Institute for Social Issues, the donated amount will be donated to the German Red Cross. If you choose not to enter any charity, the donated amount will be donated to the German Red Cross.
Before you decide how to allocate the money, please provide a series of estimations. The questions will be displayed on the monitor. Please read the instructions on the monitor carefully. Your estimations have financial consequences. In case your estimation is within a 1.00€ margin of the average from a previous session, you gain an additional 1.00€.
Your final payoff will be paid anonymously. A different person that does not know your identity will put your final payoff into a sealed envelope based on the random number you draw before you entered the room. This person does not know which payoff belongs to which participant. Your anonymity is ensured

and neither the experimenter nor the other participants know what allocation you chose.

Instructions on the monitor

[Initial belief elicitation screen]

Before you decide how to allocate your endowment of 9€, please provide a series of estimations.

How much do you think is donated on average by each participant?

How much do you think should be donated on average by each participant?

How much do you think do other participants on average state should be donated?

[Social information screen (only in the low and high info treatment)]

A sample of 4 participants, who already participated in this experiment, donated on average 2.4€/4.1€.

In order to continue, please repeat which amount was donated on average by sample of 4 participants

[Donation screen]

You receive 9€. You can allocate this amount between yourself and a charity. The allocation occurs in 1 Cent increments.

How much of your 9€ do you want to donate?

If you want that your donation is not donated to the German Red Cross but another charity, indicate the charity of your choice here:

[Updated Belief Screen]

You have now the possibility to change your estimations.

To determine your final payoff either your estimations before your donation choice or your estimations after the donation choice are selected.

How much do you think is donated on average by each participant?

Before your donation choice you estimation was:

How much do you think should be donated on average by each participant?

Before your donation choice you estimation was:

How much do you think do other participants on average state should be donated?

Before your donation choice you estimation was:

3.6.2 A2. Additional Statistical Analysis

I find supportive evidence for the heterogeneous treatment effect of social information on beliefs by means of a multivariate logit regression. The dependent variable is the change in empirical, normative, or personal normative beliefs. The base category is always no change in beliefs. As dependent variables I include the difference between social information and initial empirical, initial normative and initial personal normative beliefs respectively (distance). Since there is no social information in the baseline treatment, I measure the distance to the average donation choice of 3.30€. I also include treatment dummies and interaction effects between the distance variable and the treatment dummy. The results are depicted in figure 3.5.

Base category: no change	Empirical Beliefs		Normative Beliefs		Personal Normative Beliefs	
	Decrease	Increase	Decrease	Increase	Decrease	Increase
Lowinfo	0.64	-0.08	0.59	0.48	-0.18	-0.03
	(0.79)	(0.73)	(0.78)	(0.77)	(0.7)	(0.72)
Highinfo	0.22	0.16	1.10	0.55	-0.96	-0.64
	(0.84)	(0.7)	(0.76)	(0.79)	(0.80)	(0.69)
Distance	0.06	-0.15	0.18	0.26	-0.13	0.00
	(0.35)	(0.26)	(0.33)	(0.32)	(0.22)	(0.26)
Lowinfo*distance	-0.84*	1.47***	-0.60	0.96*	-0.08	0.92*
	(0.49)	(0.57)	(0.42)	(0.54)	(0.29)	(0.50)
Highinfo*distance	-1.03*	0.76*	-1.28**	0.41	-0.44	0.33
	(0.57)	(0.41)	(0.55)	(0.45)	(0.41)	(0.35)
constant	-1.21**	-0.61	-1.62***	-1.43***	-1.16**	-1.28**
	(0.59)	(0.46)	(0.56)	(0.52)	(0.49)	(0.51)
Observations	115		115		115	
Pseudo R^2	0.23		0.24		0.10	

Table 3.5: Multivariate logit regressions on belief changes. Standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01

I find that individuals with initial empirical beliefs above the social information significantly decrease their empirical beliefs in both social information treatments but not in the baseline treatment. At the same time, individuals with empirical beliefs below the social information significantly increase their empirical beliefs in both low info and high info but not in the baseline treatment. For normative beliefs the results are less indicative. I find that individuals only significantly decrease their normative beliefs when they are above the social information in the high info treatment and significantly increase their normative believes when they are below the social information in the low info treatment. For individuals' personal normative beliefs I find even less evidence of an effect of social information. Only in the low info treatment, I find that individuals with personal normative beliefs below the social information marginally significantly increase their personal normative beliefs. Overall, the results obtained by the multivariate logit regression support the descriptive findings of the frequencies in belief changes. Social information changes primarily empirical beliefs towards the social information. Normative beliefs are less affected. I find almost no effect of social information on changes in personal normative beliefs.

The importance of personal normative beliefs is shown in table 3.6 by introducing them into the previous OLS regressions from table 3.3. The only difference

to the two models of table 3.3 is that I also include updated personal normative beliefs (personal belief) as an independent variable. I find that updated personal beliefs significantly increase donations. Furthermore, all significant interaction effects from table 3.3 remain significant. This means that the heterogeneous treatment effect of personal beliefs caused by social information remains robust even when personal normative beliefs are included. These results indicate that both- empirical beliefs and personal normative beliefs- are important for donation decisions.

OLS Specifications (DV: Donations in Euro)	(A1)	(A2)
Personal Belief	0.54***	0.54***
	(0.10)	(0.10)
lowinfo	0.67	-1.27
	(0.53)	(0.91)
highinfo	0.24	-2.44***
	(0.56)	(0.91)
lowbelief		-3.65***
		(0.87)
medbelief	1.69**	-1.95**
	(0.7)	(0.93)
highbelief	3.65***	
	(0.87)	
lowinfo*lowbelief		1.93*
		(1.05)
highinfo*lowbelief		2.68**
		(1.07)
lowinfo*medbelief	-1.96**	-0.03
	(0.87)	(1.14)
highinfo*medbelief	-0.68	2.00*
	(0.88)	(1.13)
lowinfo*highbelief	-1.93*	
	(1.05)	
highinfo*highbelief	-2.68**	
	(1.07)	
constant	0.32	3.97***
	(0.47)	(0.90)
Observations	115	115
Adj. R^2	0.49	0.49

Table 3.6: OLS regressions on donations with personal normative beliefs and three empirical belief groups. Standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01 The dependent variable is the amount of money donated by the individual.

4. Work Motivation and Remuneration Schemes

4.1 Introduction

This paper presents a new theory of how team remuneration affects work productivity and profitability. Our contribution is to go beyond the mainstream neoclassical conception of workers as agents with self-interested, internally consistent and stable preferences. Building on well-known insights in motivation psychology, workers are recognized to be "multi-directed,"having access to multiple, discrete, context-sensitive motivation systems. Remuneration schemes are an important aspect of the workplace context, and a change in the remuneration scheme may give rise to a change in work motivation.

There is ample evidence that team incentives are widely used forms of remuneration in firms (Kruse et al., 2010; Lawler and Mohrman, 2003). Team remuneration often stimulates firm productivity, whereas merit pay and bonuses based on individual performances are often less effective in stimulating productivity than profit sharing, employee stock ownership plans, and team-based bonuses (Ehrenberg and Milkovich, 1987; Prendergast, 1999; Weitzman et al., 1990). In laboratory experiments, team incentives have been found to result in similar effort levels than flat wages (Mellizo, 2013) and individual incentives (Irlenbusch and Ruchala, 2008), though conventional economic theory implies that team incentives should induce less effort. On the basis of a series of computerized real effort task with different payment structures, Van Dijk et al. (2001) conclude that free-riding does not occur as often as theory predicts and that many participants provide more effort than under individual remuneration, albeit considerable variation in free-riding exists.

The prevalence of team performance remuneration (TPR) may seem puzzling, on account of the free-rider problem that it generates. A large literature

from neoclassical and behavioral economics tries to shed light on this puzzle. For example, some theories rely on monitoring worker's effort or performance (Alchian and Demsetz, 1972), mutual monitoring and peer pressure among workers (Kandel and Lazear, 1992) or incentives to help colleagues (Itoh, 1991, 1992)(Itoh, 1991, 1992). More recently, social preferences, such as inequality aversion, are used to explain the effectiveness of team incentives. Firms might choose TPRs over other incentive forms because they generate little payment inequality among workers, which increases effort provision (Bartling, 2011; Englmaier and Wambach, 2010; Rey-Biel, 2008). Other studies assume altruistic preferences to explain why firms use TPR over other remuneration schemes (Dur and Sol, 2010).

These neoclassical and behavioral theories cannot adequately explain the prevalence of team remuneration. Mainstream neoclassical analysis based on self-interested agents cannot explain evidence indicating that workers often seek to promote their colleagues' well-being and build friendships or companionships with them, inducing them to contribute to their performance even if they know that this imposes additional costs on them (Rotemberg, 2006).[1] For example, Bandiera et al. (2005) study workers' productivity under relative incentives, where workers' effort imposes a negative externality on others. They show that effort is lower than under individual incentives and that this is due to workers partially internalizing the negative externality, especially when working alongside their friends. Their result suggests that apart from monetary incentives, social incentives play a role in encouraging worker effort and that firms can use these incentives to induce cooperation among their employees and thereby elicit higher effort levels. Workers enjoy work partly because of the social interaction with their colleagues and the interpersonal relationships that result from working together (Bandiera et al., 2007; Morse and Weiss, 1955).

Behavioral economic theories that assume people to be consistently and persistently altruistic cannot explain why altruistically cooperative behavior manifests itself in some context but not in others. There is empirical evidence that a team's goal structure, motivation and behavior are affected by the remuneration scheme (Andersson et al., 2016; DeMatteo et al., 1998). In particular, the degree of cooperation and altruistic behavior is dependent on the remuneration scheme chosen by the firm, with workers being more altruistic towards

[1] See also Rotemberg's hypothesis that altruism can evolve endogenously under team production and increase productivity (Rotemberg, 1994; Dur and Sol, 2010).

their colleagues and more cooperative under team incentives (Deutsch, 1949). Furthermore, team incentives alter the social distance among colleagues, which is crucial for altruistic behavior, the willingness to help each other, and the salience of prosocial motives (Berger et al., 2011; Meier, 2006; Rob and Zemsky, 2002). Shared goals also generate a sense of belonging to a social group and facilitate communication, coordination, and integration among colleagues (Kerr and Slocum Jr, 1987).

Several field studies indicate that altruism may evolve endogenously under team incentives (Babcock et al., 2015; Burks et al., 2009; Carpenter and Seki, 2011). Burks et al. (2009) show that team incentives for bicycle messengers increases cooperation in a strategic form of the sequential prisoner's dilemma and find that remuneration schemes affect cooperation. Also, they find evidence that preferences of messengers are endogenous to the employer's choice of remuneration scheme, with performance pay encouraging egoism. Carpenter and Seki (2011) find that fisherman who organize and share their catch equally (essentially using team remuneration) are more altruistic in a repeated voluntary contribution mechanism. The authors suggest that social preferences contribute to explaining why pooling boats are more productive than their non-pooling competitors.

Though numerous empirical studies in behavioral economics suggest that choice architecture and other environmental settings may influence behavior (e.g. Thaler et al., 2014), no theory has thus far accounted for such effects. Our theory accounts for these empirical findings in line with a large literature in motivational psychology.

In line with this literature, we define a "motive" as a force that gives direction and energy to one's behavior, thereby determining the objective of the behavior, as well as its intensity and persistence.[2] The motivation psychology literature has identified various distinct motives, such as power, achievement, and affiliation (Heckhausen and Heckhausen, 2010; Pang, 2010). Przyrembel et al. (2015) identify seven motives that are particularly important for economic decision making. Each motive has evolved to promote survival and propagation and may be associated with a different objective function guiding behavior (Griskevicius and Kenrick, 2013). Any given objective function generates internally consistent decisions, while different objective functions need

[2]Economic implications are examined in Bosworth et al. (2016).

not generate such consistency. Different motives are activated by different external stimuli, such as remuneration systems. This means that preferences are not exclusively located within the individual, but are the upshot of an individual's interaction with her environment.

In our analysis we assume that (1) individuals have access to multiple, discrete motives, each of which is associated with a distinct objective and (2) different motives are activated by different remuneration schemes. For simplicity, we consider only two motives and two remuneration schemes, specifying two workplace contexts.[3] We call the two motives(i) the "self-interested wanting motive,"whereby a worker maximizes her own personal payoff, as represented the utility function of the selfish, rational agent of neoclassical economics, and (ii) the "caring motive,"whereby she maximizes a joint payoff with her colleagues, as represented by an altruistic utility function (e.g. Andreoni, 1990). The two remuneration schemes are (a) individual performance remuneration (IPR) and (b) team performance remuneration (TPR).

We present a simple principal-two-agent model in which workers' contributions to output are interdependent and individual effort levels cannot be perfectly observed. In this context, we derive the conditions under which IPR activates the self-interested wanting motive, while TPR activates the caring motive. Intuitively, individual remuneration may reinforce self-interested behavior, since individual remuneration rewards selfish performance, whereas team remuneration may stimulate caring behavior in the workplace by giving workers a sense of "being in the same boat".

We claim that traditional economic theory, by restricting its analysis to stable (usually selfish) preferences, overlooks a significant rationale for the use of team remuneration and how it promotes productivity and profitability, namely, that such remuneration motivates care among workers. This channel can help account for the widespread use of team remuneration in practice.

The rest of the paper is structured as follows. Section 2 presents the baseline model. Section 3 discusses the results when the remuneration schemes are exogenously given, whereas in section 4 the firm sets the parameters for the remuneration schemes in order to maximize its profit. Section 5 concludes.

[3]Our focus on two motives and two remuneration schemes is merely an analytical simplification; in practice, workers of course have access to more motives, which can be activated by more stimuli.

4.2 The Analytical Setup

We consider the interaction between a profit-maximizing principal (a firm) and two utility-maximizing agents (workers) i and j with identical utility and identical production inputs.

4.2.1 Production and Profit Functions

The contribution of worker i depends on her ability α, her effort e_i, and on the effort of the other worker e_j:

$$y_i = e_i + \alpha + \rho e_j \tag{4.1}$$

where $0 < \rho < 1$ is the "production complementarity coefficient"(measuring the degree to which i's contribution depends on j's effort). In practice, such task interdependence between workers need not just be a technological phenomenon, but can also arise from information sharing and other interpersonal interactions (Chao and Croson, 2013; Shea and Guzzo, 1989; Wageman and Baker, 1997).
The output of the firm is the sum of the contributions of the two workers:

$$q = y_i + y_j = (1 + \rho)(e_i + e_j) + 2\alpha \tag{4.2}$$

The firm's profit is the output minus the real wages paid to each worker:

$$\pi = q - w_i - w_j \tag{4.3}$$

where w_i is worker i's real wage.
Whereas the firm's overall output q is observable, the workers' contributions y_i and y_j are not directly observable to the firm. Instead, the firm can observe an individual productivity signal s_i for each worker i, correlated with her contribution level

$$s_i = y_i + \sigma_i \tag{4.4}$$

where σ_i is white noise with mean zero.
The wage depends on the remuneration scheme chosen by the firm. Under individual performance remuneration (IPR), worker i receives a piece rate payment

a_i, i.e. a proportion of each unit of the observed output that she generates:

$$w_i^I = a_i s_i \tag{4.5}$$

where the superscript I denotes IPR and $a_i > 0$.
Under team performance remuneration (TPR), the firm pays each worker a proportion of its total revenue. Since the workers are homogeneous, each worker receives the same share of output b:

$$w_i^T = w_j^T = b * q \tag{4.6}$$

where the superscript T denotes TPR and $b > 0$.

4.2.2 Utility Functions

Under IPR, worker i's utility under the self-interested wanting motive is

$$U_i^{I,S} = a_i s_i - \frac{c}{2} e_i^2 \tag{4.7}$$

where the superscript S stands for "self-interested" and c is an effort disutility parameter.
Worker i's utility under the caring motive for IPR is

$$U_i^{I,C} = (1-\kappa)\left(a_i s_i - \frac{c}{2} e_i^2\right) + \kappa\left(a_j s_j - \frac{c}{2} e_j^2 - \xi\right) \tag{4.8}$$

where the superscript C stands for "caring". κ is the "care parameter", $0 \leq \kappa \leq \frac{1}{2}$, indicating the degree to which one worker takes account of the other worker's well-being. The special case where $\kappa = \frac{1}{2}$ represents "perfect care", whereby the other worker's wellbeing is weighted equally as one's own, whereas $\kappa = 0$ represents perfect self-interestedness. ξ is the cost of caring for the colleague. For example, social interactions that foster care or to imagine how the other worker feels is time consuming (Rotemberg, 1994). We assume that the cost of caring can be negative. For example, under team remuneration when the other worker is also caring.
Under team performance remuneration (TPR), worker i's utility under the self-interest wanting motive is

$$U_i^{T,S} = (bq - \frac{c}{2} e_i^2) \tag{4.9}$$

Worker i's utility under the caring motive for TPR is

$$U_i^{T,C} = (1-\kappa)(bq - \frac{c}{2}e_i^2) + \kappa(bq - \frac{c}{2}e_j^2 - \xi) \tag{4.10}$$

In this analytical context, it is clear that due to the free-rider problem the firm will choose TPR over IPR only if TPR induces the worker to adopt the care motive, whereas IPR promotes the self-interested wanting motive. Accordingly, we proceed to explore the conditions under which these motives are elicited. In Section 3 the remuneration schemes (IPR and TPR) are exogenously given, whereas in Section 4 the firm sets the parameters of IPR and TPR in order to maximize its profit.

4.3 Team versus Individual Remuneration under Exogenous Remuneration Schemes

In this section we examine the motivational implications of exogenously given individual and team remuneration schemes (leaving the endogenization of remuneration to Section 4). Under IPR, worker i's utility functions for the self-interested and caring motives are given by equations (4.7) and (4.8), respectively. We consider the IPR in Nash equilibrium, i.e. worker i achieves their maximal levels of utility with respect to effort e_i, for a given level of e_j, and, by symmetry, $a_i = a_j$ in equilibrium.

Proposition 1 *In Nash equilibrium, under IPR with an exogenously given and constant piece rate a_i, worker i adopts the self-interested wanting motive when*

$$\frac{a_i^2\rho^2}{2c(1-\kappa)} < \xi \tag{4.11}$$

Thus the incentive to adopt the self interested motive under IPR falls with the degree of complementarity ρ and the care parameter κ.

The condition in the proposition above ensures that $\widehat{U}_i^{I,S} > \widehat{U}_i^{I,C}$ independent of wether the other worker is caring or self-interested wanting motivated. (The proofs of all propositions are given in the appendix.)

Under an exogenous TPR given by the output share b, the worker i's utility functions under the self-interest and care motives are given by equations (4.9) and (4.10),respectively. Again, we consider a Nash equilibrium in which each

worker achieves her maximal level of utility with respect to effort e_i, for a given level of e_j.

Proposition 2 *In Nash equilibrium, under TPR with an exogenous, constant output share b, worker i chooses the caring motive when*

$$\frac{\kappa b^2(1+\rho)^2}{2(1-\kappa)^2 c} < -\xi \tag{4.12}$$

Thus the incentive to adopt the caring motive falls with the degree complementarity ρ and the degree of care κ.

The condition in the previous proposition ensures that $\widehat{U}_i^{T,C} > \widehat{U}_i^{T,S}$. Intuitively, an increase in the degree of production complementarity ρ increases the positive externality that the other worker j's effort has on the utility of the worker, whereas an increase in the care parameter κ increases the amount of effort of the other worker when care motivated. Therefore, the incentive to free-ride increases for worker i and to not adopt the care motive.
The effects of the self-interested and caring motive on the workers' effort and the firm's profit are comparable when each piece rate under IPR is equal to twice the output share under TPR: $a_i = a_j = 2b$. These effects are summarized in the following proposition.

Proposition 3 *When (i) each piece rate under IPR is equal to twice the output share under TPR ($a_i = a_j = 2b$) and (ii) workers are caring under TPR but self- interested under IPR, then worker i's optimal effort and firm's expected profit are higher under TPR than under IPR in equilibrium, whenever the following condition holds:*

$$\rho > 1 - 2\kappa \tag{4.13}$$

Thus the incentive to provide more effort and generate more profit under TPR than under IPR rises with the degree of production complementarity ρ and the degree of care κ.

Intuitively, the larger the degree of complementarity ρ, the greater is the marginal benefit of worker i's effort under care and TPR, while the worker's effort under self- interest and IPR remains unchanged.[4] It is straightforward

[4]The proposition also echoes previous results by Bandiera et al. (2005) and Dur and Sol (2010): An increase in the degree of care towards the other worker increases the degree to which the externality they impose on others is taken into account and thus optimal effort

to show that whenever effort under TPR is greater than under IPR and the two piece rate equal twice the output share, the firm's profit is also greater under TPR than under IPR (see appendix).
Finally, we consider the condition under which workers have an incentive to switch from firms offering IPR to those offering TPR, for the firm's switching cost θ, and to accompany this switch by abandoning the self-interested motive and adopting the caring motive.

Proposition 4 *When (i) workers are caring under TPR but self-interested under IPR and (ii) each piece rate is equal to twice the output share ($a_i = a_j = 2b$), then worker i switches from a firm offering IPR to one offering TPR when*

$$\frac{a_i^2(1-2\kappa-\rho)(2\kappa-3\rho+4\kappa\rho-1)}{8c(1-\kappa)^2} > \kappa\epsilon+\theta \tag{4.14}$$

Thus the incentive to switch from a firm offering IPR to one offering TPR rises with the degree of care κ.

Under this condition, which ensures that $\widehat{U}_i^{T,C} > \widehat{U}_i^{I,S} + \theta$, workers self-select into team remuneration, becoming more productive in the process. See, for example, Vyrastekova et al. (2012) for empirical evidence on self-selection into team incentives.

4.4 Team versus Individual Remuneration under Endogenous Remuneration Schemes

We now consider the following sequence of decisions. First, the firm sets the remuneration scheme, taking the effect of this decision on workers' motives and effort inputs into account. We assume that the firm has perfect information about the workers' motive and effort decision and when it sets the remuneration scheme. Second the workers make their motivation and effort decisions, taking the remuneration as given. We consider the IPR in Nash equilibrium with a profit maximizing firm, i.e. worker i achieves their maximal levels of utility with respect to effort e_i for a given level of e_j.

provision. The proposition also implies that whenever the caring motive is not active under TPR ($\kappa = 0$), workers' effort under IPR always exceeds effort under TPR. This mirrors the standard economic free-rider problem with selfish preferences. In the other extreme case under "perfect care", where the worker is perfectly altruistic ($\kappa = \frac{1}{2}$), effort is always larger under TPR, even if the complementarity is zero.

Proposition 5 *There exists a Nash equilibrium under IPR with a profit maximizing firm in which worker i adopts the self-interested and a Nash equilibrium under TPR with a profit maximizing firm in which worker i adopts the care motive.*

As under exogenous remuneration schemes, it can be in the interest of worker i to adopt the caring motive under TPR while remain self-interested under IPR. The next propositions summarize the effects of workers' effort and firm's profit when workers are self-interested motivated under IPR and caring motivated under TPR.

Proposition 6 *When workers are caring motivated under TPR but self- interested motivated under IPR and the firm chooses the profit-maximizing remuneration scheme, then worker i's optimal effort under TPR is higher than under IPR ($(\widehat{e}_i)^{T,C} > (\widehat{e}_i)^{I,S}$)*

A caring employee works harder when remunerated by TPR than a self- interested employee under IPR, independently of the degree of complementarity ρ or the care parameter κ. However, the firm's profit is not necessarily higher under TPR than under IPR when effort is higher because the optimal piece rates are not longer linear in the output shares.

Proposition 7 *When workers are caring under TPR but self-interested motivated under IPR and the firm chooses the profit-maximizing remuneration scheme, then the firm's expected profit is higher under TPR than under IPR in equilibrium ($E(\widehat{\pi})^{T,C} > E(\widehat{\pi})^{I,S}$), when*

$$(1+\rho)^2(2\kappa+\rho-1)-(\alpha c)^2(3\kappa+\rho(1-\kappa)-1)(1-\kappa)>0 \tag{4.15}$$

Here the firm's incentive to adopt TPR with caring workers instead of IPR with self-interested workers rises with the degree of care when the ability parameter is zero. Then there exists an incentive for firms to choose TPR over IPR even when firms set their piece rate or output share in order to maximize their profit.
Finally, we ask under what conditions worker i switches from a firm offering IPR to one offering TPR, accompanying this switch from a self-interested to a caring work motive.

Proposition 8 *When (i) workers are caring under TPR but self-interested under IPR and the firm chooses the profit-maximizing remuneration scheme,*

then worker i switches from a firm offering IPR to one offering TPR when

$$\frac{(1+\rho-\alpha c)^2}{8c(1+\rho)^2}-\frac{(1+\rho)^2-(\alpha c)^2}{4c(1+\rho)}-\frac{(1+\rho-\alpha c(1-\kappa))^2}{32c(1-\kappa)^2}+\frac{(1+\rho-\alpha c(1-\kappa))((1+\rho)^2+\alpha c(1-\kappa)(3-\rho))}{8c(1-\kappa)(1+\rho)}>\kappa\xi+\theta \tag{4.16}$$

This condition implies that $\widehat{U}_i^{T,C} > \widehat{U}_i^{I,S} + \theta$.

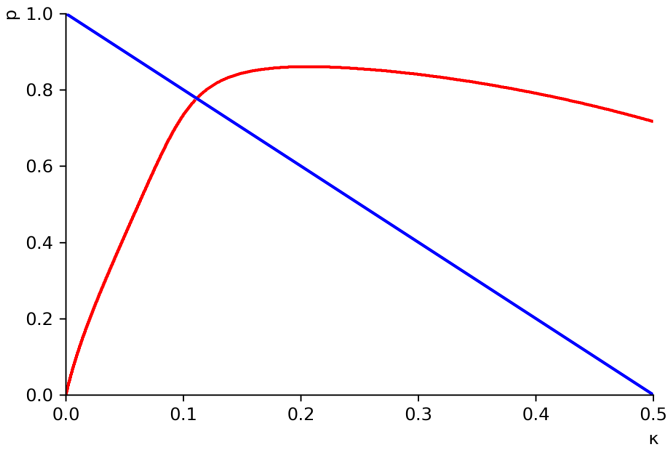


Figure 4.1: A numerical example of the firm choice and worker choice condition. The blue line depicts the firm choice and worker choice condition, respectively. The red line depicts the condition under proposition 5 in which workers are self-interested under IPR and caring under TPR. $\alpha = 0.1$, $c = 5$, $\epsilon_{TR} = 0$, $\epsilon_{IR} = 1$.

A numerical example of the firm choice condition and the worker choice condition is illustrated in figure 4.1.[5] The horizontal axis measures the degree of care κ, while the vertical axis corresponds to the degree of complementarity in production ρ. Recall that the firm choice condition (proposition 7) and the worker choice condition (proposition 8) require workers to remain self-interested under IPR and to adopt the care motive under TPR (proposition 5). In the figure, proposition 5 is fulfilled for the care parameter and the production complementarity parameter below the red line.[6] The firm choice and the worker choice condition are both fulfilled for values above the blue line.

[5]Note that the values for the ability and cost parameter are set such that the incentive compatibility constraints are fulfilled (i.e. the optimal output share and the piece rates are positive).

[6]Note that the values for the ability and cost parameter are set such that proposition 5 simplifies to this one equation since all other necessary conditions of proposition 5 are always fulfilled.

In other words, the firm's expected profit is higher under TPR (with caring workers) than under IPR (with self-interested workers) in equilibrium for the care and production complementarity parameters that fulfill both conditions, i.e. for values that lie above the red and below the blue line. Similarly, workers' utility is higher under TPR (with a caring motive) than under IPR (with a self-interested motive) in equilibrium for the care and production complementarity parameters that fulfillboth conditions, i.e. for values that lie above the red and below the blue line. This is the case when the care parameter κ equals 0.3 and the complementarity parameter ρ equals 0.6

4.5 Conclusion

Our theory of multi-directed work motivation helps account for the empirically observed prevalence of team performance remuneration. We show that incorporating multiple motives into the analysis of a simple principal-agent model can improve our understanding of internal incentive structures and how individuals inside an organization behave. In particular, our model shows that team incentives can be optimal, i.e. the free-rider problem can be overcome, if the switch from individual remuneration to team remuneration induces workers to switch from the self-interest to the care motive. We have also derived conditions under which workers switch towards a firm offering team incentives. Furthermore, we derived conditions under which firms an incentive to adopt team incentives instead of individual incentives.

Clearly, human resource management and other institutional factors are also capable of activating distinct motives and can thereby play an important role for decision making within organizations. Our analysis provides a simple framework for investigating these factors.

4.6 Appendix B

Proof of Proposition 1 and Proposition 2

The condition to adopt the self-interested motive instead of the caring motive is derived by maximizing worker i's utility function for the self-interested and caring motives given by equations (2.7) and (2.8) with respect to effort, respectively. Under a self-interested motive the optimal effort is given by

$$e_i^{I,S} = \frac{a_i}{c} \tag{4.17}$$

and the optimal effort under caring motive is given by

$$e_i^{I,C} = \frac{a_i(1-\kappa(1-\rho))}{(1-\kappa)c} \tag{4.18}$$

Worker i remains self-interested and does not adopt the caring motive when the self-interested utility is higher than the caring utility in equilibrium. The optimal effort levels are inserted into the corresponding utility functions to obtain the condition under which the utility of being self-interested wanting is higher than being caring. When the other worker is self-interested motivated the condition to adopt the self-interested wanting motive is

$$U_i^{I,S,S} > U_i^{I,C,S} \tag{4.19a}$$

Interting the functional forms we choose this is equivalent to

$$\frac{a_i^2\rho^2}{2c(1-\kappa)} < \xi \tag{4.19b}$$

The second inequality is obtained by simply plugging in the functional forms. When the other worher is caring motivated the condition to adopt the selif-interested wanting motive is

$$U_i^{I,S,C} > U_i^{I,C,C} \tag{4.20a}$$

Interting the functional forms we choose this is equivalent to

$$\frac{a_i^2\rho^2}{2c(1-\kappa)^2} > -\xi \tag{4.20b}$$

If we assume that the caring cost is positive this second condition always holds. Similarly, the team caring condition is derived by maximizing worker i's utility

function for the self-interested and caring motives given by equations (2.9) and (2.10) with respect to effort, respectively. Under a self-interested motive the optimal effort is given by

$$e_i^{T,S} = \frac{b(1+\rho)}{c} \tag{4.21}$$

and the optimal effort under caring motive is given by

$$e_i^{T,C} = \frac{b(1+\rho)}{(1-\kappa)c} \tag{4.22}$$

Worker i adopts the caring motive and does not remain self-interested when the caring utility is higher than the self-interested utility in equilibrium. When the other worker is care motivated the condition to adopt the care motive is obtained when

$$\widehat{U}_i^{T,C,C} > \widehat{U}_i^{T,S,C} \tag{4.23a}$$

Interting the functional forms we choose this is equivalent to

$$\frac{\kappa b^2(1+\rho)^2}{2(1-\kappa)^2 c} < -\xi \tag{4.23b}$$

When the other worker is self-interested motivated the condition to adopt the care motive is

$$\widehat{U}_i^{T,C,S} > \widehat{U}_i^{T,S,S} \tag{4.24a}$$

Interting the functional forms we choose this is equivalent to

$$\frac{\kappa b^2(2-3\kappa)(1+\rho)^2}{2(1-\kappa)c} > \xi \tag{4.24b}$$

where the second superscript stands for worker i's motive, and the third superscript for the motive of worker j. If we assume that the caring cost is negative this second condition always holds. In order for worker i to adopt the self-interested wanting motive under IPR and the care motive under TPR the care cost parameter needs to be context-sensitive. One explanation for why the care parameter can be negative under TPR but not IPR is guilt by selfish workers under TPR. For example because they take advantage of the other worker. This is not the case under IPR.

Proof of Proposition 3

We assume that $a_i = 2b$, thus

$$e_i^{I,S} = \frac{2b}{c} \tag{4.25}$$

Workers under TPR with a caring motive exert more effort than under IPR with a self-interested motive when

$$e_i^{T,C,C} > e_i^{I,S,S} \tag{4.26a}$$

$$\rho > 2(1-\kappa) - 1 \tag{4.26b}$$

The same inequality also holds when comparing firm's expected profit under TPR and caring workers with firm's expected profit under IPR and self-interested workers because

$$E(\pi^{T,C,C}) = E(q)(1-2b) > E(q)(1-a) = E(\pi^{I,S,S}) \tag{4.27a}$$

$$E(q)(1-2b) > E(q)(1-2b) \tag{4.27b}$$

$$2(1+\rho)e_i^{T,C} + 2\alpha > 2(1+\rho)e_i^{I,S} + 2\alpha \tag{4.27c}$$

$$e_i^{T,C,C} > e_i^{I,S,S} \tag{4.27d}$$

where E is the expectations operator.

Proof of Proposition 4

We assume that switching from a firm offering IPR to a firm offering TPR causes the workers cost of θ. Worker i switches from a firm offering IPR to a firm offering TPR when the utility is higher in equilibrium. In order to obtain the condition, we insert the optimal effort under TPR with caring workers and IPR with self-interested workers into the corresponding utility functions, which implies that

$$\widehat{U}_i^{T,C,C} > \widehat{U}_i^{I,S,S} + \theta \tag{4.28a}$$

Interting the functional forms we choose this is equivalent to

(4.28b)

$$\frac{a_i^2(1-2\kappa-\rho)(2\kappa-3\rho+4\kappa\rho-1)}{8c(1-\kappa)^2} > \kappa\epsilon + \theta \tag{4.28c}$$

Proof of Proposition 5

Under endogenous remuneration schemes, the firm sets the piece rate and output share such that it maximizes its profit, respectively. We assume that the firm knows the motive of the workers.

The optimal piece rate under IPR with self-interested workers is derived by inserting the optimal effort level (see proofs of propositions 1 and 2) under IPR with self-interested and / or caring workers into the profit function and maximizing it with respect to the piece rate:

$$\widehat{a}_i^{I,S,S} = \frac{1+\rho-\alpha c}{2(1+\rho)} \tag{4.29a}$$

$$\widehat{a}_i^{I,S,C} = \frac{(1-\kappa)(\kappa(3\rho^2+\rho-2)-2\alpha c(\kappa+\rho-1-0.5\rho\kappa)}{\rho^2(5\kappa^2-8\kappa+4)-4(1-\kappa)^2} \tag{4.29b}$$

$$\widehat{a}_i^{I,C,S} = \frac{(1+\rho)(^2(\rho(1+\rho)-2)-4\kappa(\rho^2-1)+\kappa\rho-2\rho-2)+\alpha c(1-\kappa)(2\kappa\rho^2+\kappa\rho-2\kappa+2\rho+2)}{5\kappa^2\rho^2-4(1-\kappa)^2+\rho^2(1+\kappa)} \tag{4.29c}$$

$$\widehat{a}_i^{I,C,C} = \frac{1+\rho-\alpha c(1-\kappa)-\kappa(1-\rho^2)}{2(1+\rho-\kappa(1-\rho^2))} \tag{4.29d}$$

where the second superscript stands for worker i's motive, and the third superscript for the motive of worker j. The optimal piece rate depends on worker i's and worker j's motive and corresponding optimal effort under IPR. The corresponding optimal piece rates are substituted into the utility-maximizing effort to obtain worker i's optimal effort under IPR with endogenous remuneration schemes. Worker i remains self-interested and does not adopt the caring motive with a profit maximizing firm when the self-interested utility is higher than the caring utility depending on whether the other worker j is self-interested or caring motivated.

When the other worker is self-interested motivated the condition to adopt the selif-interested wanting motive is

$\widehat{U}_i^{I,S,S} > \widehat{U}_i^{I,C,S}$

Interting the functional forms we choose this is equivalent to

$\kappa(\kappa-1)(\rho+1.0)^2(2c\xi(\kappa-1)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)^2+(\kappa-1)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2)^2-(-2(\kappa-1)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)+2\rho(\kappa\rho(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(-\kappa^2\rho+2\kappa^2+3\kappa\rho-4\kappa-2\rho+2+3\kappa^2\rho^2+\kappa^2\rho-2\kappa^2-5\kappa\rho^2-\kappa\rho+4\kappa+2\rho^2-2)-(\kappa-1)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)(2\kappa^2\rho^2+\kappa^2\rho-2\kappa^2-2\kappa\rho^2+\kappa\rho+4\kappa-2\rho-2-\kappa^2\rho^3-2\kappa^2\rho^2+\kappa^2\rho+2\kappa^2+4\kappa\rho^3+3\kappa\rho^2-5\kappa\rho-4\kappa+2\rho^2+4\rho+2))+2(\kappa-1)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-$

$\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2))(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2))(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)+(\kappa-1)^2(-+\rho+1)(1.0(\rho+1.0)-0.25+0.5\rho(-+\rho+1)+0.25\rho+0.25)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)^2(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)^2+(\rho+1.0)^2((-\kappa+1)(\kappa\rho(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2)+(\kappa-1)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)(2\kappa^2\rho^2+\kappa^2\rho-2\kappa^2-2\kappa\rho^2+\kappa\rho+4\kappa-2\rho-2-\kappa^2\rho^3-2\kappa^2\rho^2+\kappa^2\rho+2\kappa^2+4\kappa\rho^3+3\kappa\rho^2-5\kappa\rho-4\kappa+2\rho^2+4\rho+2))^2-2(\kappa-1)^2(-(\kappa-1)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)+\kappa\rho(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(-\kappa^2\rho+2\kappa^2+3\kappa\rho-4\kappa-2\rho+2+3\kappa^2\rho^2+\kappa^2\rho-2\kappa^2-5\kappa\rho^2-\kappa\rho+4\kappa+2\rho^2-2)+\rho(\kappa-1)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2)-(\kappa-1)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)(2\kappa^2\rho^2+\kappa^2\rho-2\kappa^2-2\kappa\rho^2+\kappa\rho+4\kappa-2\rho-2-\kappa^2\rho^3-2\kappa^2\rho^2+\kappa^2\rho+2\kappa^2+4\kappa\rho^3+3\kappa\rho^2-5\kappa\rho-4\kappa+2\rho^2+4\rho+2))(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)(2\kappa^2\rho^2+\kappa^2\rho-2\kappa^2-2\kappa\rho^2+\kappa\rho+4\kappa-2\rho-2-\kappa^2\rho^3-2\kappa^2\rho^2+\kappa^2\rho+2\kappa^2+4\kappa\rho^3+3\kappa\rho^2-5\kappa\rho-4\kappa+2\rho^2+4\rho+2))>0$

When the other worker is caring the condition to adopt the selif-interested wanting motive is

$\widehat{U}_i^{I,S,C} > \widehat{U}_i^{I,C,C}$

Interting the functional forms we choose this is equivalent to

$(\kappa(8c\xi(\kappa-1)^2(\kappa\rho^2-\kappa+\rho+1)^2+2(\kappa-1)(-2(\kappa-1)(\kappa\rho^2-\kappa+\rho+1)+\kappa\rho(\kappa-+\kappa\rho^2-\kappa+\rho+1)+\rho(\kappa\rho-\kappa+1)(\kappa-+\kappa\rho^2-\kappa+\rho+1)-(\kappa-1)(\kappa-+\kappa\rho^2-\kappa+\rho+1))(\kappa-+\kappa\rho^2-\kappa+\rho+1)+(\kappa\rho-\kappa+1)^2(\kappa-+\kappa\rho^2-\kappa+\rho+1)^2)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)^2/8+(\kappa-1)^2(\kappa\rho^2-\kappa+\rho+1)^2(5\kappa^2\rho^2-4\kappa^2-4\kappa\rho^2+8\kappa-4\rho^2-4)(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2)^2/2+(\kappa-1)(-2(\kappa-1)(-2(\kappa-1)(\kappa\rho^2-\kappa+\rho+1)+\kappa\rho(\kappa-+\kappa\rho^2-\kappa+\rho+1)+\rho(\kappa\rho-\kappa+1)(\kappa-+\kappa\rho^2-\kappa+\rho+1)-(\kappa-1)(\kappa-+\kappa\rho^2-\kappa+\rho+1))+(\kappa\rho-\kappa+1)^2(-\kappa+-\kappa\rho^2+\kappa-\rho-1))(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)^2(\kappa-+\kappa\rho^2-\kappa+\rho+1)/8+(\kappa-1)(-(\kappa-1)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)-\rho(\kappa\rho(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2)+(\kappa-1)(5\kappa^2\rho^2-4\kappa^2-8\kappa\rho^2+8\kappa+4\rho^2-4)(2\kappa^2\rho^2+\kappa^2\rho-2\kappa^2-2\kappa\rho^2+\kappa\rho+4\kappa-2\rho-2-\kappa^2\rho^3-2\kappa^2\rho^2+\kappa^2\rho+2\kappa^2+4\kappa\rho^3+3\kappa\rho^2-5\kappa\rho-4\kappa+2\rho^2+4\rho+2))+(\kappa-1)(-5\kappa^2\rho^2+4\kappa^2+4\kappa\rho^2-8\kappa+4\rho^2+4)(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2))(\kappa\rho^2-\kappa+\rho+1)^2(\kappa^2\rho-2\kappa^2-3\kappa\rho+4\kappa+2\rho-2-3\kappa^2\rho^2-\kappa^2\rho+2\kappa^2+5\kappa\rho^2+\kappa\rho-4\kappa-2\rho^2+2))>0$

The optimal output share under TPR with self-interested workers is derived

by inserting the optimal effort level under TPR with self-interested and / or caring workers into the profit function and maximizing it with respect to the output share:

$$\widehat{b}^{T,S,S} = \frac{1}{4}(1 - \frac{2\alpha c}{(1+\rho)^2}) \tag{4.32a}$$

$$\widehat{b}^{T,S,C} = \widehat{b}^{T,C,S} = \frac{1}{4}(1 - \frac{4\alpha c(1-\kappa)}{(2-\kappa)(1+\rho)^2}) \tag{4.32b}$$

$$\widehat{b}^{T,C,C} = \frac{1}{4}(1 - \frac{2\alpha c(1-\kappa)}{(1+\rho)^2}) \tag{4.32c}$$

The optimal output share depends on worker i's and worker j's motive and corresponding optimal effort under TPR. The corresponding optimal output shares are substituted into the utility-maximizing effort to obtain worker i's optimal effort under TPR with endogenous remuneration schemes. Worker i adopts the caring motive with a profit maximizing firm when the care utility is higher than the self-interested utility depending on whether the other worker j is self-interested or caring motivated.

When the other worker is self-interested motivated the condition to adopt the care motive is

$\widehat{U}_i^{T,C,S} > \widehat{U}_i^{T,S,S}$

Interting the functional forms we choose this is equivalent to

$\kappa(16\alpha^2c^2\kappa^3 - 36\alpha^2c^2\kappa^2 + 4\alpha^2c^2\kappa + 16\alpha^2c^2 - 8\kappa^3\rho^2 - 16\kappa^3\rho - 8\kappa^3 + 36\kappa^2\rho^2 + 72\kappa^2\rho + 36\kappa^2 - 52\kappa\rho^2 - 104\kappa\rho - 52\kappa + 24\rho^2 + 48\rho + 24 + 32c\xi\kappa^3\rho^2 + 64c\xi\kappa^3\rho + 32c\xi\kappa^3 - 160c\xi\kappa^2\rho^2 - 320c\xi\kappa^2\rho - 160c\xi\kappa^2 + 256c\xi\kappa\rho^2 + 512c\xi\kappa\rho + 256c\xi\kappa - 128c\xi\rho^2 - 256c\xi\rho - 128c\xi + 1\kappa^3\rho^4 + 4\kappa^3\rho^3 + 6\kappa^3\rho^2 + 4\kappa^3\rho + 1\kappa^3 - 4\kappa^2\rho^4 - 16\kappa^2\rho^3 - 24\kappa^2\rho^2 - 16\kappa^2\rho - 4\kappa^2 + 4\kappa\rho^4 + 16\kappa\rho^3 + 24\kappa\rho^2 + 16\kappa\rho + 4\kappa)/(c(32\kappa^3\rho^2 + 64\kappa^3\rho + 32\kappa^3 - 160\kappa^2\rho^2 - 320\kappa^2\rho - 160\kappa^2 + 256\kappa\rho^2 + 512\kappa\rho + 256\kappa - 128\rho^2 - 256\rho - 128)) > 0$

When the other worker is caring the condition to adopt the caring motive is

$\widehat{U}_i^{T,C,C} > \widehat{U}_i^{T,S,C}$

Interting the functional forms we choose this is equivalent to

$\kappa(-16\alpha^2c^2\kappa^4 + 68\alpha^2c^2\kappa^3 - 104\alpha^2c^2\kappa^2 + 68\alpha^2c^2\kappa - 16\alpha^2c^2 + 8\kappa^3\rho^2 + 16\kappa^3\rho + 8\kappa^3 - 36\kappa^2\rho^2 - 72\kappa^2\rho - 36\kappa^2 + 52\kappa\rho^2 + 104\kappa\rho + 52\kappa - 24\rho^2 - 48\rho - 24 + 32c\xi\kappa^4\rho^2 + 64c\xi\kappa^4\rho + 32c\xi\kappa^4 - 192c\xi\kappa^3\rho^2 - 384c\xi\kappa^3\rho - 192c\xi\kappa^3 + 416c\xi\kappa^2\rho^2 + 832c\xi\kappa^2\rho + 416c\xi\kappa^2 - 384c\xi\kappa\rho^2 - 768c\xi\kappa\rho - 384c\xi\kappa + 128c\xi\rho^2 + 256c\xi\rho + 128c\xi + 1\kappa^3\rho^4 + 4\kappa^3\rho^3 + 6\kappa^3\rho^2 + 4\kappa^3\rho + 1\kappa^3 - 4\kappa^2\rho^4 - 16\kappa^2\rho^3 - 24\kappa^2\rho^2 - 16\kappa^2\rho - 4\kappa^2 + 4\kappa\rho^4 + 16\kappa\rho^3 + 24\kappa\rho^2 + 16\kappa\rho + 4\kappa)/(c(32\kappa^4\rho^2 + 64\kappa^4\rho + 32\kappa^4 - 192\kappa^3\rho^2 - 384\kappa^3\rho - 192\kappa^3 + 416\kappa^2\rho^2 + 832\kappa^2\rho + 416\kappa^2 - 384\kappa\rho^2 - 768\kappa\rho - 384\kappa + 128\rho^2 + 256\rho + 128))$

Again, we assume that the caring cost is positive under IPR and negative under TPR. This allows for Nash equilibria with self-interested workers under IPR and caring workers under TPR.

Proof of Proposition 6

Under endogenous remuneration schemes, the optimal effort level under TPR with caring workers is higher than under IPR with self-interested workers when $e_i^{T,C,C} > e_i^{I,S,S}$, which implies that

$$(1+\rho)^2 + (1-\kappa)(\alpha c(1-\rho) + 2(1+\rho)) > 0 \tag{4.35}$$

which is positive for all possible values of the corresponding parameters.

Proof of Proposition 7

The above calculated optimal output shares and piece rates as well as optimal effort levels are inserted into the corresponding profit function of the firm. A firm switches to TPR with caring workers from IPR with self-interested workers when the expected profit is higher, which implies that

$$E(\widehat{\pi})^{T,C,C} > E(\widehat{\pi})^{I,S,S} \tag{4.36a}$$

$$(1+\rho)^2(2\kappa+\rho-1) - (\alpha c)^2(3\kappa+\rho(1-\kappa)-1)(1-\kappa) > 0 \tag{4.36b}$$

Proof of Proposition 8

The above calculated optimal output shares and piece rates as well as optimal effort levels are inserted into the corresponding utility function of the worker. Under the firm choice condition, worker i switches from a firm offering IPR (under a self-interested motive) to a firm offering TPR (under a caring motive) whenever the utility of doing so in equilibrium is higher which implies that

$$\widehat{U}_i^{T,C,C} > \widehat{U}_i^{I,S,S} + \theta$$

Interting the functional forms we choose this is equivalent to

$$\frac{(2\kappa+\rho-1)(8\alpha^2c^2\kappa^2 - 16\alpha^2c^2\kappa + 8\alpha^2c^2 - 4\alpha c\kappa\rho - 4\alpha c\kappa + 4\alpha c\rho}{32c(\kappa-1)^2(\rho+1)^2}$$
$$+\frac{(2\kappa+\rho-1)(4\alpha c - 4\kappa\rho^3 - 10\kappa\rho^2 - 8\kappa\rho - 2\kappa + 3\rho^3 + 7\rho^2 + 5\rho + 1)}{32c(\kappa-1)^2(\rho+1)^2} > \kappa\xi + \theta \tag{4.37a}$$

where θ is the cost of switching from a firm offering IPR to a firm offering TPR.

5. When Does Team Remuneration Work? An Experimental Study on Interactions Between Workplace Contexts

5.1 Introduction

Traditional economic theory fails to explain why firms use team remuneration to incentivize their workers (Baker et al., 1988). In theory, the free-rider problem leads workers to shirk under such incentives because they bear the full costs of their efforts while receiving only a fraction of their productivity (Alchian and Demsetz, 1972; Holmstrom, 1982).[1] Since individual performance incentives do not contain such a social dilemma, we would expect them to outperform team incentives when available. Team remuneration is, however, a prevalent form of compensation in many organizations (Kruse et al., 2010; Lawler and Mohrman, 2003).

Firm's agency to design workplace context exceeds merely setting incentive structures. Total output can be increased through team remuneration if firms successfully establish a workplace context that leads to cooperation among workers. In order to create a cooperative workplace context, firms need to promote a team identity among colleagues. Team identity facilitates communication, coordination, and integration among team members by creating

[1] In what follows, we use the terms team incentive and team remuneration synonymously. These terms describe a classic "sharing rule" a la Holmstrom (1982). A worker receives a compensation that depends on the team's total output irrespective of her exerted effort.

a feeling of membership in a well-defined group (Eckel and Grossman, 2005; Kerr and Slocum Jr, 1987). Team building exercises serve the purpose to help workers to identify with a team (see Riener and Wiederhold, 2016; Tajfel, 1978). They aim to increase communication and common as well as successful experiences between workers usually unrelated to the firm's trades (Buller and Bell Jr, 1986; Salas et al., 1999). Importantly, these two elements at the firm's discretion, the form of remuneration and actions to promote a team identity, interact with one another (Andersson et al., 2016). We extend the analysis of this interaction by the dimension of complementarities between workers. This study analyzes how the form of remuneration interacts with the contextual factors of team identity and degree of complementarity in the form of synergies in production to influence cooperation at the workplace. By means of a laboratory experiment we present insights on when team remuneration yields higher effort than individual remuneration and how this result depends on the workplace context. Our insights inform the existing literature on how workers' beliefs and motivations vary across interactions between contextual elements at the workplace.

Complementarities in production in the form of team synergies are present when effort provided by a worker affects a team member's productivity too. Such complementarities can manifest through communication, sharing of knowledge and ideas, increased creativity resulting from more diverse labor inputs as well as enjoying working together towards an ambitious goal with workers with diverse expertise. Complementarities are therefore an important influence on team output in many firms. Team identity and remuneration choice also interact with complementarities in efforts between workers. On the one hand, it is easy to see that the degree to which workers notice and build on complementarities between colleagues varies and can be influenced through team building exercises. Communication and common experiences increase awareness of and exposure to existing complementarities. The reverse is also straightforward: when skills are highly specialized but a common target should be met, specialists need to communicate and coordinate actions with one another which in turn has the potential to lead to a team identity. On the other hand, the form of remuneration interacts with complementarities. Rotemberg (1994) argues that it depends on the remuneration scheme to which degree workers are willing to internalize positive externalities of production that result from existing synergies. In particular, team remuneration enables workers to signal

own cooperative behavior to team members. When synergies between workers are high, this signal becomes less noisy under team remuneration.

Recently, the experimental investigation of interactions between elements of workplace context has received increasing attention from economists (Andersson et al., 2016; Riener and Wiederhold, 2016; Weber and Camerer, 2003). The bottom line is that elements like incentivization of effort, the decision to control worker's productivity, organizational values and culture, team feeling, and social preferences of workers should all be aligned to optimally motivate employee performance. We add new insights to this literature since our evidence suggests that team remuneration can lead to higher effort than individual remuneration, but only when complementarities in the form of team synergies are high. Moreover, while previous research has considered the interaction between workplace context and worker-level social preference type, we extend this analysis to the interaction of workplace context and social preference type with motivational states and beliefs. Our results indicate that beliefs and achievement motivation affect the decision to provide effort differently depending on the workplace context.

Subjects in our study take part in a novel two-person team building exercise. This task serves to induce a team identity by allowing for communication between team members and entertaining joint team achievements. Afterwards, subjects participate in a stylized effort game with the same team member as before. In a 2x2 design, we vary the incentive scheme (team and individual remuneration) and the degree of team synergy (low and high). The effort game consists of 15 rounds in which subjects first decide how much effort they want to put in and subsequently state their belief about the effort decision of their team member for each round. In addition to the beliefs, our experiment also assesses a proxy for a social preference type by means of Social Value Orientation (SVO). Finally, we identify how five distinct motives that are particularly important within organizations react to the team building exercise and how these motives are causally affected by the different remuneration schemes and the degree of synergy in the effort game. To this end, subjects' motivational states are measured before and after the team building exercise as well as after the effort game.

In contrast to Nash equilibrium predictions, we find that under high team synergy team remuneration results in higher effort levels than individual remuneration. The opposite ranking is found under low team synergy. Furthermore,

effort is significantly higher than the Nash equilibrium in all treatments. We argue that this is mainly driven by our team building exercise as it significantly affects subjects' motives.

We further find that beliefs about the other team member's effort influence the own effort decision significantly less under team remuneration and high team synergy than under individual remuneration and high team synergy. Furthermore, the influence of achievement motive on effort varies between treatments. Most prominently, under high team synergy the effect of a higher achievement motive on effort is negative under individual remuneration while it is positive under team remuneration. This indicates a change in the influence of achievement motive depending on the workplace context in line with the concept of "we thinking". The concept of "we thinking" describes a mode of reasoning in which an individual is motivated to pursue the goals of the group instead of individual goals (Akerlof, 2016; Deutsch, 1949). If workers are motivated to pursue the group's goal as one's own, they will provide high individual effort under team remuneration and hence cooperate despite the possibility to free ride. Whereas the combination of team building, team remuneration and high team synergy induces more achievement oriented subjects to act towards a group goal and cooperate more, this result does not hold under individual remuneration where achievement motivated subjects seem to be motivated to pursue their individual goals. Finally, more prosocial subjects do not exert more effort under team remuneration compared to individual remuneration in the high team synergy treatments. Higher effort under team incentives and high synergies therefore cannot be entirely attributed to more prosocial team members. We interpret these results as indicative that cooperation is not only belief and trait type dependent, but context-dependent.

The paper is structured as follows. In the next section, we present previous insights about workplace context relevant to our study. Section three presents literature on the importance of different motives for decision making within organizations. The design of our experiment is shown in section four. Section five presents our results and section six concludes.

5.2 Relation to the Literature

5.2.1 Team Remuneration and Team Synergies

Teamwork and team incentives are common in many organizations (see e.g. Kruse et al., 2010; Lazear and Shaw, 2007). For instance, Kruse et al. (2010) report that almost half of American private-sector employees' pay is tied to the team's performance. Team remuneration can have profound advantages for team members and firms since they alter the social distance among team members and the salience of prosocial motives (Berger et al., 2011; Meier, 2006; Rob and Zemsky, 2002).

The problem of free-riding under team incentives arises when the joint output is shared among team members and the marginal product of each team member is not observable. Agents have thus an incentive to shirk. Economic theory suggests that in the absence of effective monitoring, individual remuneration schemes should be preferred over team remuneration schemes (Alchian and Demsetz, 1972; Holmstrom, 1982). Explanations for the use of team remuneration found in the literature include incentives to help others (Itoh, 1991), peer pressure (Kandel and Lazear, 1992), and social preferences (Englmaier and Wambach, 2010).

When comparing the efficiency of team and individual remuneration empirical studies find mixed results. Some studies find that team remuneration schemes underperform compared to individual remuneration schemes as economic theory suggests (Encinosa III et al., 2007; Erev et al., 1993; Gaynor and Gertler, 1995; Nalbantian and Schotter, 1997; Thurkow et al., 2000). Other authors find no significant difference in the performance between team and individual remuneration (Farr, 1976; London and Oldham, 1977; McGee et al., 2006; Vandegrift and Yavas, 2011; Van Dijk et al., 2001). Finally, several empirical studies find team superior to individual remuneration schemes (Allison et al., 1993; Babcock et al., 2015; Hamilton et al., 2003; Pizzini, 2010). These mixed results indicate that team remuneration alone is insufficient to increase cooperation and motivate workers to exert more effort and that more attention towards the exact circumstances that make team remuneration work is warranted.

Team synergy may explain why team remuneration is used in organizations despite its theoretical underperformance. Under team synergy individual output

is a function not only of the worker's own effort, but also of the team members' effort (Alchian and Demsetz, 1972; Chao and Croson, 2013; Lawford, 2003).[2] One of the few exceptions in the economics literature that acknowledges the importance of team synergies as a mechanism that promotes collaboration is by Lasker et al. (2001) on medical partnerships; another study is by Wageman and Baker (1997) in a laboratory experiment. Chao and Croson (2013) show in an experiment that team remuneration outperforms individual remuneration when synergies are high enough. Given the parametrization of their experimental setup, the intuition for their result is straightforward. When effort externalities are sufficiently large, this effect outweighs the free-rider problem. However, the degree of complementarity in effort needed for selfish individuals to exert more effort under team than under individual remuneration is so large that it is only reasonable to assume for a small fraction of firms such as highly specialized partnerships (Pizzini, 2010). Team synergies can also be described as a form of positive externality. The economic literature on games with positive externalities suggests that cooperation increases with an increase in the externality (Chaudhuri, 2011; Zelmer, 2003). The willingness of workers to internalize positive externalities depends on how easy it is to demonstrate altruistic deeds towards their colleagues (Rotemberg, 1994).

5.2.2 Team Identity

The economic literature mostly neglects that workers are rarely motivated by pure selfishness and that successful teamwork builds on social interactions, norms, and structures among co-workers (**??**Granovetter, 2005; Huck et al., 2012; Riener and Wiederhold, 2016). Social identity theory provides a useful framework to explain why team members do not necessarily shirk under team remuneration. It argues that individuals behave primarily as members of well-defined and clearly distinct social groups (Tajfel, 1978). A work team can constitute such a social group and hence shape norms, values, and attitudes that influence workers' interactions (Akerlof and Kranton, 2000, 2005; Eckel and Grossman, 2005). A social or team identity shared with colleagues, facilitates cooperation among team members by creating a feeling of membership.

[2]Note that team synergies differ from strategic complements. Strategic complements exist when a change of another subject' choice positively affects the marginal payoff of a subject.

Related to team identity and cooperation among work teams is the concept of "we thinking". It describes a mode of reasoning in which an individual is motivated to pursue the team's goals (Akerlof, 2016). Once successfully established, team identity promotes "we thinking", in which individuals perceive themselves as part of the "we". This makes it more salient for workers to exert high effort even when free-riding is possible. An example of "we thinking" is found between soldiers who are often motivated to action by thinking about what is best for the group even if it means risking their own lives (Akerlof, 2016; Shils and Janowitz, 1948). Social psychologists refer to this concept as "group cohesion". Group pride is put forward by different researcher as a reason for why subjects pursue group ends instead of individualistic ones (e.g. Tyler, 1999). In line with this research, empirical studies have induced team identities and generally found that this suppressed self interest in favor of the team's interests (Bacharach et al., 1999; Bandiera et al., 2005, 2013; Brewer and Kramer, 1986; Charness, 2012; Chen and Chen, 2011; Chen and Li, 2009; Eckel and Grossman, 2005; Gold and Sugden, 2007; Hargreaves Heap and Zizzo, 2009; Kramer and Brewer, 1984; Lankau et al., 2012; Weber and Camerer, 2003).

Team identity is created either based on naturally occurring characteristics of group members, like race, sex, and occupation or artificially. The well-known minimal group paradigm Tajfel (1970) is often used to induce group or team identities. Here, group membership is assigned randomly based on some superficial criterion like a preference for painters and subsequently labeling the different groups with different names. Goette et al. (2012) suggest, however, that this is an oversimplification that does not capture essential aspects of team identity in the real world. The authors provide evidence that additional motivations which arise when group induction is not minimal are important determinants of individual behavior towards both in-group and out-group team members (see also Pan and Houser, 2013). Eckel and Grossman (2005) explore the extent to which team identity can deter shirking and free-riding behavior in a public good game that resembles a team production setting. Their results provide evidence that random anonymous team assignments are insufficient to overcome self-interests, whereas actions designed to enhance artificial team identity by letting them solve a task together contribute to higher levels of cooperation (see also Babcock et al., 2015).

Riener and Wiederhold (2016) rely on a team building exercise consisting of a

simple coordination game to induce a team identity. Successful team building exercises facilitate positive group experiences and mutual judgement about the team experience among workers and can therefore present a source of pride of the group's achievement (Sundstrom et al., 1990). Their results indicate that practices and contextual elements at the workplace directed towards increasing worker's effort should be aligned. Team building works best to create a team identity when it is complemented by suitable incentives. For example, in a work context characterized by a team identity, imposing strict controls on workers' outputs inhibits cooperation.

The economic literature on interaction effects between several contextual elements at the workplace is scarce. There is a rising interest among economists in studying different dimensions of corporate culture on economic outcomes (Earley et al., 1993; Kosfeld and von Siemens, 2011; Van den Steen, 2010; Weber and Camerer, 2003). One notable exception is the experimental study by Andersson et al. (2016) which studies how personal preferences, corporate culture, and different incentive schemes interact with each other in a tournament to determine effort provision. They find that the "triple-fit", or alignment, of these three elements is important to optimally motivate workers. However, no study has shown how team synergy, remuneration schemes and team identity align to create a cooperative workplace context.

5.2.3 Motives and Traits at the Workplace

Research in social psychology differentiates between states and dispositional characteristics, so-called traits. A state is a momentary emotional reaction to internal and/or external triggers which involves physical, motivational, cognitive and psychological reactions and hence drives behavior. Traits are often used to describe subject's personality characteristics that are stable over time. Traits interact with context-dependent factors to activate motivational states. It is this subjective motivational state which in turn drives the psychological, behavioral and emotional reactions once it is activated (Schultheiss and Brunstein, 2001). Decades of psychological, biological, and neuroscientific research suggests that distinct context-sensitive motivational states are associated with distinct action tendencies and decisions (Emmons and McAdams, 1991; Pang, 2010). Motivational states, or motives, are defined as dispositions to experience particular types of incentives as pleasurable and rewarding, to strive for

certain types of goals, and hence to activate particular behavioral tendencies and related decisions (Schultheiss and Strasser, 2012; Heckhausen, 1977; Utz et al., 2004). This notion stands in contrast to classical economic theories, which assume that decisions are determined by stable preferences, which are generally assumed to be context-insensitive, stable over time and exogenously given. Worker's motivation and the underlying motivational states are thus an integral part of their performance equation at the workplace (Chatman, 1989; Grandey et al., 2002).

The seminal research by McClelland (1971, 1987) based on Murray (1938) focuses on an array of distinct workplace related needs or motives, including, achievement, affiliation, power, and autonomy. By far, most of the attention in McClelland's model focuses on the needs for achievement (defined as behavior directed toward competition with a standard of excellence) and power (defined as a need to have control over one's environment). In a similar vein, Griskevicius and Kenrick (2013)'s research sheds light on motives that can be relevant at the workplace. These motives are affiliation, self-protection, status attainment and caring (see also Kenrick et al., 2010; Schaller et al., 2007). For example, individuals use different exchange rules and behavioral tendencies when interacting at the workplace with friends and allies (affiliation) or competitors and superiors (status attainment). When Griskevicius and Kenrick (2013)'s need for self-protection is active, behavior that pursues selfish wanting or consumption is triggered. This behavior is associated with an increased focus on own needs and behavioral tendencies towards the maximization of individual resources, less cooperative behavior as well as increased preferences towards social distance and solitary activities (Lea and Webley, 2006; Vohs et al., 2006). Finally, it has long been known that the motive to care for your colleagues is an important driver of behavior at the workplace (Hersey, 1932; Roethlisberger and Dickson, 2003). Barsade and O'Neill (2014) have found that a culture of care at the workplace increases well-being and teamwork. Also, social psychologists have found that the care motive leads to helping others and an increasing interest in other's welfare (Goetz et al., 2010; Condon and Feldman Barrett, 2013). A key implication of this framework that different contexts activate different motives is that the same information from the environment may be interpreted and acted upon very differently. The specific behavior depends on the trait characteristics of the individual and how she appraises the context. Depending on which motivational system has been

primed to process the contextual stimuli, different behavior can emerge.
Given the context of our study, we focus on five motives that have theoretical and empirical evidence for workplace motivation as outlined above. These five motives are achievement, affiliation, care, power-status and selfish-wanting/consumption. In the appendix in table A.1 we present an overview and definitions of our motives and examples for their importance at the workplace. The table also contains words that are specific to these five motives and are used in the experiment. These words are selected based on a semantic categorization task in which subjects are asked to ascribe a number of motive-related words to motivational categories (Przyrembel et al., 2015).
In terms of behavioral tendencies related to trait characteristics, more prosocial individual cooperate generally more even when free-riding is possible (e.g. Balliet et al., 2009)(e.g. Balliet et al, 2009). Social value orientation (SVO) by Murphy et al. (2011) provides a numeric score which can be used as a proxy to determine the prosociality of individuals.

5.3 Experimental Design

Our experimental design consists of three core building blocks. The first is an exogenous manipulation of team identity by instituting a team building exercise. The team building exercise is supposed to lead to a common experience of having achieved something non-trivial and engaging together. This generates a feeling of collegiality or membership to a group (i.e. "being in the same boat") (see Eckel and Grossman, 2005; Riener and Wiederhold, 2016). The team building is operationalized by using a spot the difference task with the possibility to communicate with the team member. To the best of our knowledge, this team building exercise in its concrete computerized form is novel in the experimental economics literature.
The second block is a two-player effort game, conducted after subjects participated in the team building exercise. Across four treatments we vary either the form of remuneration or the degree of team synergy in production between subjects. The core feature of the game is that higher effort is monetarily more costly, but increases not only one's own production but also the production of the team member (depending on the degree of complementarity in effort). Each subject is matched with its previous team member from the team building exercise.

The third block follows after the effort game and examines a proxy of trait prosociality by social value orientation (SVO, Murphy et al., 2011). The experiment further measures the impact of the team building exercise and the treatments in the effort game on motives that are relevant at the workplace. Motives are measured using a questionnaire of words related to five different motives (see Przyrembel et al., 2015). They are measured at three different times in the experiment, at the beginning of the experiment, after the team building exercise, and after the effort game. All experimental blocks were computerized and conducted in z - Tree (Fischbacher, 2007). At the end of the experiment, subjects completed a short questionnaire on their sociodemographic characteristics. Figure 5.1 depicts the sequence of the experiment. Screenshots from the different experimental stages can be found in the appendix. All stages of the experiment were incentivized with an experimental currency unit denominated in points. The exchange rate from points to Euro was 250 to 1 and common information to all subjects before the first stage of the experiment.

Figure 5.1: Sequence of the experiment

5.3.1 Design of the Team Building Exercise

The team building exercise consists of a spot the difference task in randomly matched groups of two that includes the possibility to communicate with each other via a computerized chat. Communication not only helps intra-team coordination but has been shown to successfully increase cooperation in social dilemmas and decrease free-riding in public good games (Balliet, 2010; Charness and Kuhn, 2011; Isaac and Walker, 1988).

In this task, each group is presented with picture pairs of three different paintings.[3] Each of the three picture pairs has a number of differences but is otherwise identical. The task is to find as many of the unknown differences as

[3]The three picture pairs are the Dancing class by Degas, the Kiss by Klimt and the Wanderer above the Sea of Fog by Friedrich. Two of the picture pairs were provided by pyrosphere. Pyrosphere (pyrosphere.net) is a game developer firm that developed a spot

possible within an allotted time of three minutes for each picture pair. After the three minutes elapse, only the left picture of the pair is displayed for an additional minute. When the left picture disappears after 60 seconds, subjects have to enter individually the amount of mistakes they found in a box on the screen. Subjects can communicate by means of a computerized chat during the team building exercise except for those screens on which they individually have to enter the number of differences they found.[4] Subjects are instructed not to reveal any personal information about themselves in the chat and informed that their identities remain anonymous throughout the whole experimental session. The additional minute in which only one picture is displayed and the chat serve the purpose to facilitate coordination on the differences found. The two team members receive each 25 points for each difference found. They do, however, only receive the points if both team members individually enter the same number and the number chosen is not higher than the total number of differences in the picture pair. These conditions ensure that both team members have to coordinate in order to receive any payment. The coordination was sufficiently simple to facilitate the establishment of team identity and pairs who successfully mastered the task have justifiable reason to be proud of their achievement since it takes considerable effort to find a high number of correct differences (Akerlof, 2016; Riener and Wiederhold, 2016). In addition, the task is designed to rule out the possibility that subjects learn how cooperative their team member behaves. This is particularly important to avoid any heterogeneous spillover effects onto the effort game.

The subjects did not receive any feedback on how many differences their team member actually entered in the box or the total number of mistakes per picture pair until the end of the experiment. This avoids reciprocal effects, formation

the difference task for classical paintings for mobile devices and who were kind enough to provide some pictures for the team building exercise. One picture pair was retrieved from the internet.

[4]We checked the chat protocols to see whether personal information was exchanged during the two-player interaction. Nearly all subjects limited their discussion only to the game. Since dropping the subjects who did reveal their identities or personal information leaves all results virtually unchanged, we kept them in the sample. No team found every difference in the team building exercise. In fact, the average number (standard deviation) of differences found was 8.18 (1.76) out of 15 total differences (Klimt), 7.65 (1.42), out of 10 (Degas), and 6.68 (1.06) out of 10 (Friedrich). This indicates that the spot the difference task inhibited an appropriate amount of difficulty.

of beliefs about ability or type of the team member as well as other motivational responses. At the end of the exercise, subjects are asked how much fun they had doing the task and how successful they perceived the cooperation with the team member. This was done on a 7 point scale, ranging from "not at all" to "very much". On average (standard deviations in parentheses), subjects rated the task as being a 6.31 (1.03) fun and 6.26 (0.75) successful. We take this as evidence that the team building exercise leads to a sense of achievement in subjects and is perceived as engaging and entertaining. The exercise was chosen such that it is unrelated to the tasks to be performed in the next stages, i.e. the coordinative element of our team building exercise played a central role. No information that could potentially alter subjects' beliefs or judgements, for example, by exposing social preferences, is revealed through the coordinative team building exercise.

5.3.2 Design of the Effort Game

The effort game is a modified version of the design developed by Chao and Croson (2013) and involves a 2x2 design: the remuneration scheme (individual and team) and team synergy levels (high and low) are varied. Each subject i is randomly assigned to one of the four treatments. Importantly, teams stay identical between the team building exercise and the effort game which implies a partner matching in the effort game. Both, team synergy level and remuneration scheme are between-subject factors. Teams consist of two subjects who simultaneously choose effort levels e_i from the integers $0, 1, ..., 105$ independently from each other. Effort generates production, y_i according to the following function:

$$y_i = 10 * e_i + s * e_j \tag{5.1}$$

with $j = 1, 2$ and $i \neq j$, and e_j being the effort of the other team member. The marginal product of effort on one's own production is 10 in all treatments. s describes the marginal product on the team member's production. Hence, s is the team synergy level and is set to 1 in the low team synergy treatments and to 9 in the high team synergy treatments. While higher efforts increase production linearly, the costs of effort increase quadratically:

$$C(e_i) = 0.1 * e_i^2 \tag{5.2}$$

with $i = 1, 2$. Note that different from the production function, effort costs only depend on subject i's own chosen effort. Under the individual remuneration scheme, each team member receives payoffs depending on their own production. The subjects' payoff under individualized remuneration is then

$$\pi_i^{ind} = y_i - C(e_i) \tag{5.3}$$

Under the team remuneration scheme, team members share the total team production $(y_i + y_j)$ equally. The subjects' payoff under team remuneration is then

$$\pi_i^{team} = \frac{1}{2}(y_i + y_j) - C(e_i) \tag{5.4}$$

The first order conditions yield the following equilibrium efforts for both remuneration schemes:

$$e_i^{*ind} = 50 \text{ and } e_i^{*team} = 25 + 2.5 * s \tag{5.5}$$

The social optima read:

$$e_i^{SO\ ind} = e_i^{SO\ team} = 50 + 5 * s \tag{5.6}$$

The equilibrium predictions generated by our parametrization are depicted in Table 5.1. Given the positive team synergy, socially optimal effort always exceeds the corresponding Nash equilibrium. Nash equilibrium efforts are predicted to be always larger under individual remuneration than under team remuneration. This holds because the team synergy level is smaller than the marginal product of one's own effort level. This assumption seems realistic for most organizational teams. In this aspect we deviate from Chao and Croson (2013) who focus on partnerships in which the marginal product of the partner can exceed the marginal product of one's own effort on the own production. Raising the team synergy level above one's own marginal product resolves the free-rider problem under team remuneration and thus results in Nash equilibria that are higher under team remuneration than under individual remuneration. In addition, we elicit subjects' beliefs about team member's effort in every round. After each effort decision, subjects are asked to guess what integer between 0 and 105 the team member chose for her effort in this round. Following Gächter and Renner (2010), we incentivize the guesses with 150 points if the guess does not deviate more than 10 integers from the actual team member's choice.

$e_i \in 0, 1, ..., 105$	Ind. remuneration	Team remuneration
Low team synergy (s=1)		
Equilibrium effort (NE)	50	27.5
Socially-optimal effort (SO)	55	55
High team synergy (s=9)		
Equilibrium effort (NE)	50	47.5
Socially-optimal effort (SO)	95	95

Table 5.1: Equilibrium predictions

Subjects play 15 rounds in each session under a single treatment. After choosing an effort level and guessing the team member's effort, subjects are reminded of their own decision, receive feedback about their team member's decision, and their respective earnings for each round in points. Communication is not allowed at this stage of the experiment. Effort decisions from one of the 15 rounds are randomly chosen to be paid out in the end. Likewise, one different round is randomly chosen for the payoff from the stated beliefs. An example of the translated version of instructions can be found in the appendix. The choice set and parameters were chosen such that it is impossible for the subjects to generate negative payments over the course of the experiment. In order to control for income effects, we set the show up fee such that under the Nash equilibria, subjects receive almost identical payments across treatments.
Before the 15 rounds were played, each subject has to complete two comprehension questions about the incentive structure that they subsequently face. Each question consists of choosing an integer from $0, 1, ..., 105$ for both team members as hypothetical effort decisions. Afterwards, based on their choices, subjects have to calculate their costs, which could be read from a provided cost table, as well as the own or team production, depending on the remuneration scheme of the treatment, and the total payoff that each team member would receive from the hypothetical decisions. To make sure that subjects understood the game, the correct answer is displayed after they finished providing answers for each of the two comprehension questions. No subject received any information about the entries and performance of their respective team member. Subjects choose their own hypothetical effort levels in this comprehension

check to prevent possible anchoring effects Furnham and Boo (2011). Completing this comprehension check is incentivized.

5.3.3 Design of Motivation- and Trait-Elicitation Procedure

In order to assess the impact of the team building exercise and the treatments of the effort game on motives, subjects take part in three questionnaires over the course of the experiment probing their motivational states. Each questionnaire consists of the identical 17 items. The order of these items is randomized per subject and for each time the subject encountered the motive questionnaire. Subjects work on them at the beginning of the experiment, after the team building exercise, and after the effort game. All questions ask the subjects how they rate their current motivational state with respect to a certain motivation which was presented as a word. In particular, subjects select on a 7-point scale ranging from "not at all" to "very much", "to which degree they feel like one of the following motivations in this very moment". Each subject provides such ratings for five motives that are relevant at the workplace, achievement (3 words), affiliation (3), care (3), power-status (3), and selfish-wanting/ consumption (3), as well as the affective states of being happy and being sad. These words were selected to be maximally specific indicators for distinct motives (Przyrembel et al., 2015). A complete list of words can be obtained upon request. Subjects in this task receive 180 points every time they completely answer the questionnaire.

After the last questionnaire, subjects participate in an implementation of the SVO Slider Measure task Crosetto et al. (2012). The SVO measures a person's preferences on how to allocate resources between the self and another person. We use this measurement to elicit the prosocial trait of our subjects. Subjects make distribution decisions on the 6 primary items of the SVO measure. For the SVO measurement, subjects are randomly regrouped into groups of two. The regrouping protocol ensured that they are not matched with another subject they had already previously encountered in the team building exercise and effort game. This is common knowledge to the subjects. The subjects are told that one of the six rounds and their role in it would be chosen ran-

domly to be paid out.[5] Similar to Riener and Wiederhold (2016) and Fehr and Williams (2013) our prosocial trait measurement is conducted at the end of the experiment.

5.4 Hypotheses

The hypotheses in this subsection follow from the previously presented empirical findings. We hypothesize that a cooperative workplace context consisting of team remuneration and high team synergy after a team building exercise results in higher effort compared to any other treatment.

Hypothesis 1:*Efforts under TR high are the highest across all treatments.*

This implies that effort under TR high is higher than under IR high. Although team remuneration aligns team's goals with the team identity, the free rider problem under low team synergy is expected to be prevalent enough for individual remuneration to yield higher effort. Hence, the degree of synergy is decisive for team remuneration to lead to higher effort than individual remuneration which follows from Rotemberg (1994).
We further hypothesize that effort in the effort game is significantly higher than Nash equilibrium in all treatments.

Hypothesis 2: *All treatments yield effort levels that are significantly higher than Nash predictions due to subjects' participations in the previous team building exercise.*

Whereas Chao and Croson (2013) find in a similar effort game without a team building exercise that effort converges towards the respective Nash equilibrium, the economic literature on team identity and team building suggests that cooperation above Nash equilibrium can be maintained during the entire game. We expect that effort deviates from Nash equilibria towards the social optima since the team building exercise leads to a shared team identity and team feeling (Chen and Li, 2009; Eckel and Grossman, 2005; Riener and Wiederhold, 2016). The continuation of the partner matching between team building exer-

[5]The items are parametrized such that subjects could earn between 113 and 750 points.

cise and effort game should further strengthen cooperative bonds within work teams independent of the team synergy and the remuneration choice.
Effort decisions above Nash equilibrium, can be rationalized by social preferences of the form

$$U_i = (1 - x_i) * \pi_i + x_i * \pi_j \tag{5.7}$$

where i's utility from the payoffs in the effort game, U_i, depends on i's own payoff from the effort game, π_i, the team member's payoff from the effort game, π_j, and x_i, the degree of how much i's utility positively depends on j's payoff. For effort decisions that lie above the Nash equilibrium but are at most as high as the social optimum it follows that $0 < x_i \leq 0.5$. In addition, the hypothesis that effort under TR high is higher than under IR high implies under such social preferences that $x_i^{TR\ high} > x_i^{IR\ high}$; which is indicative of context-dependent social preferences.
Since motives are affected by the context in which an individual takes a decision, we hypothesize that the team building exercise as well as the effort game affect motives scores. In particular, the team building exercise will increases scores on more prosocial motives, i.e. affiliation and care and those that are outcome related, i.e. achievement and power-status due to their team accomplishments.

Hypothesis 3: *The team building exercise will increase prosocial (care and affiliation) and outcome related (achievement and power-status) motives. TR high will lead to the highest states of care and affiliation as well as achievement motives.*

In the effort game, the different treatments will affect motives differently. We hypothesize that the cooperative context of team building exercise, team remuneration and high team synergy results in the highest prosocial motive states, i.e. care and affiliation, and that the hypothesized high cooperation levels result in the highest states of (team-)achievement compared to others.

5.5 Results

5.5.1 Effort and the Workplace Context

The data collection took place between April and June 2017. The experiment was organized and administered with the software hroot (Bock et al., 2014) and programmed with the software z-Tree (Fischbacher, 2007). In total, 230 subjects participated in the experiment. Of these, 52 (26 pairs) took part in in the individual remuneration - low team synergy treatment (IR low), 60 in individual remuneration - high team synergy (IR high), 60 in team remuneration - low team synergy (TR low) and 58 in team remuneration - high team synergy (TR high). Subjects came from the University of a WEIRD city subject pool and study diverse subjects, with 31% of the subjects having an economics related background. The share of females in the experiment was 47%. According to Boschloo tests, we find neither significant gender differences nor significant differences in the share of economics students across the four treatments. Subjects earned on average €11.21 for participating in a session, which lasted around 90 minutes.

Result 1: *Average effort under TR high is significantly the highest across all treatments.*

Average effort decisions over 15 rounds in the effort game by treatment are as follows; IR low: 54.76 [51.78, 57.74][6], IR high: 67.17 [57.55, 76.79], TR low: 44.58 [37.68, 51.48], TR high: 82.51 [75.81, 89.21]. Our main result is expressed in Figure 5.2, which depicts average effort decisions over 15 rounds for all four treatments. As can be seen, TR high displays the highest average efforts over all rounds, followed by IR high, IR low, and TR low. Figure 5.2 also shows that the end-game effect occurs in the team remuneration treatments, which is common in finitely repeated social dilemma games (see e.g. Ledyard, 1994). This can be interpreted as evidence that subjects are aware of the free-rider strategy as being individually rational in the TR treatments. As for the low synergy treatments, we see little variation in average effort levels over the 15 rounds with IR low effort decisions slowly converging towards the Nash equilibrium. Independent of the team synergy, selfish rational optimiza-

[6] 95% confidence interval calculated with standard errors clustered at the team level.

tion implies that effort under IR is always higher than under TR as seen in Table 5.1.

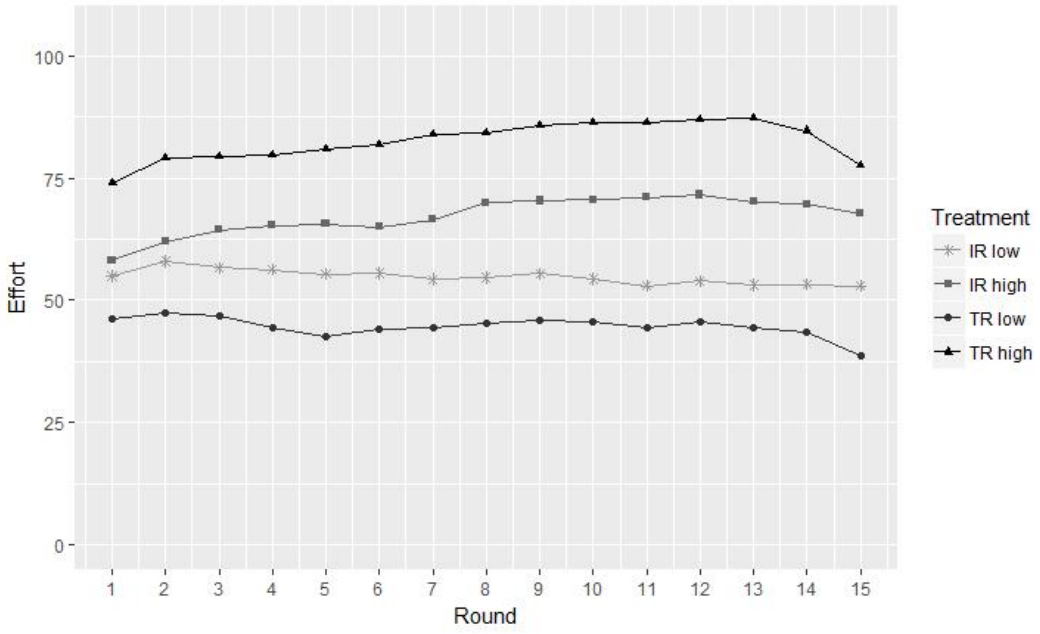


Figure 5.2: Average effort decisions over 15 rounds across treatments. IR low: Nash equilibrium, social optimum: 50, 55; IR high: Nash equilibrium, social optimum: 50, 95; TR low: Nash equilibrium, social optimum: 27.5, 55; TR high: Nash equilibrium, social optimum: 47.5, 95

When one compares average effort decisions over 15 rounds at the group level between treatments, we find that average effort decisions of TR low are indeed lower than under IR low (Wilcoxon rank sum test, $p = 0.005$).[7] However, effort under TR high is significantly higher than effort under IR high ($p = 0.016$). This evidence suggests that the degree of team synergy is important to explain situations where TR leads to higher effort than IR in the presence of team identity. Note also that effort levels between IR high and IR low do not differ significantly ($p = 0.113$).[8] Result 1 is also supported by regression analysis. Table 5.2 presents GLS random - effects regression models with stan-

[7]All subsequent tests for differences in mean effort levels over 15 rounds across treatments were done with the Wilcoxon rank sum test. Before these tests were conducted, a Kruskal-Wallis test was performed that investigated whether the four treatment means differ significantly. The test indicated that pairwise tests for treatment differences are permissible ($H = 40.27$, $df = 3$, $p < 0.01$).

[8]Moreover, TR high has significantly higher average efforts over 15 rounds than both IR low and TR low at both $p < 0.001$. Also, IR high leads to significantly higher efforts than TR low at $p = 0.002$.

dard errors clustered at the team level. The dependent variable is the effort decision over all 15 rounds.

DV: Effort decisions over 15 rounds		
Model	(1)	(2)
IR high	12.42**	13.16***
	(5.07)	(4.89)
TR low	-10.18***	-10.48***
	(3.75)	(3.72)
TR high	27.75***	28.31***
	(3.63)	(3.45)
Female	-	-12.92***
		(2.78)
Age	-	-0.39
		(0.39)
Econ	-	-4.65*
		(2.51)
Constant	54.76***	72.57***
	(1.39)	(10.05)
Observations	3450	3450
N	230	230
Overall R^2	0.28	0.33

Table 5.2: Random - effects regressions on effort decisions across treatments estimated with the GLS method. Standard errors clustered at the team level in parentheses. ** = $p < 0.05$; *** = $p < 0.01$

Model 1 confirms the results from Figure 5.2: Chosen effort differs significantly across treatments. In addition to the treatment dummies, model 2 includes the control variables Female, Age and Economics background. Including these controls does neither change the size of the coefficient estimates nor decrease their significance considerably. Females put in significantly less effort into the effort game and having an economics background also has a negative influence on effort decisions that is marginally significant.

Result 2: *Average effort is significantly higher than its respective Nash equilib-*

rium prediction for all treatments.

It becomes apparent from Figure 5.2 that average effort exceeds Nash equilibrium predictions in all four treatments. We find that effort averages over 15 rounds at the team level differ from their respective Nash equilibrium prediction at the below 1% significance level for all treatments using the Wilcoxon signed-rank test. We interpret result 2 as evidence that the common team experience, the repeated interaction, and communication with the identical team member in the team building exercise leads to more cooperative behavior between team members across all treatments.

Result 3: *Workplace context influences motives significantly.*

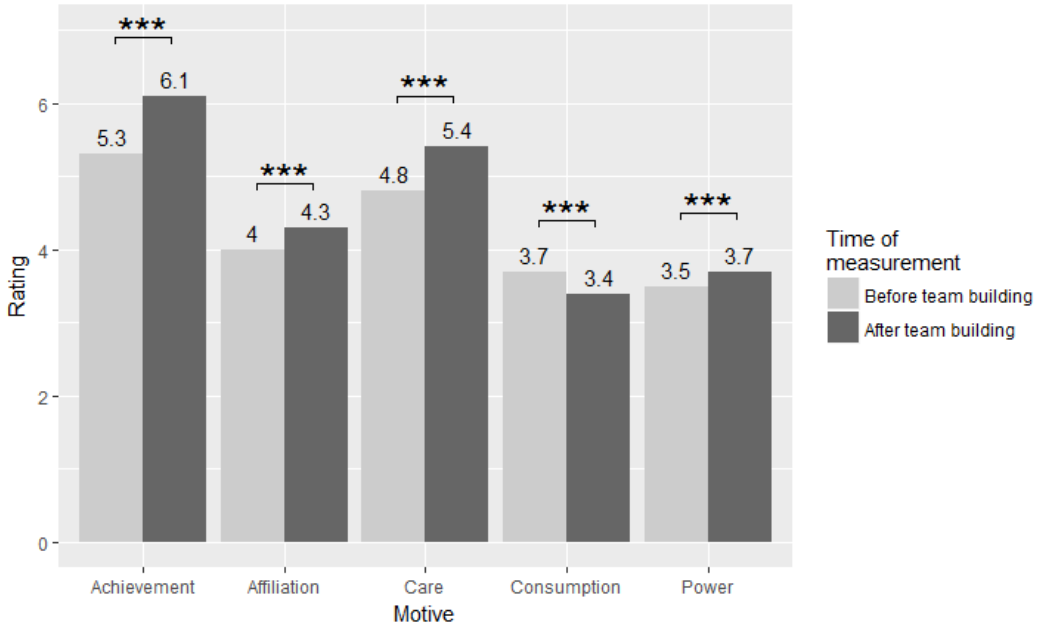


Figure 5.3: Motive ratings before and after the team building exercise

Figure 5.3 depicts average motive scores at the baseline measurement from the beginning of the experiment and average motive scores measured directly after the team building exercise. We find that the team building exercise increases states of achievement, affiliation, care and power motives significantly, while it decreases states of the selfish-wanting /consumption motive significantly. All of these differences are significant below the 1% significance level. The non-

parametric test used for these results evaluates the Somers' D statistic.[9] We see this as evidence that the first component of our workplace context, the team building exercise, varies the degree to which motives are perceived.

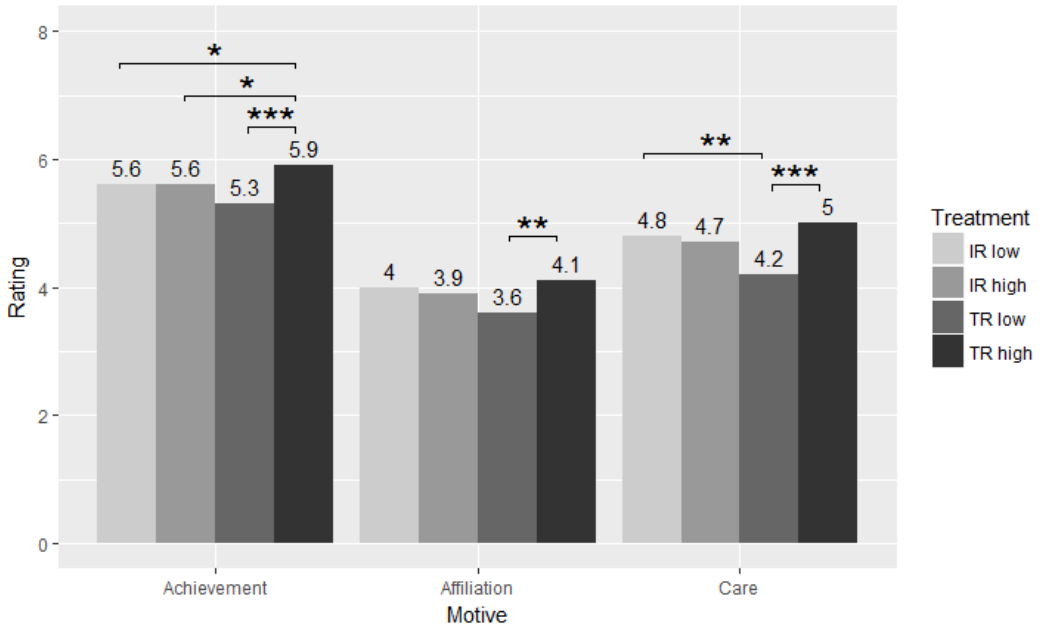


Figure 5.4: Motive ratings after the effort game

Treatment specific differences in motivational states can arise after subjects have participated in the effort game. Figure 5.4 shows average motive scores of achievement, affiliation and care motives after the effort game by treatment. Figure 5.4 focuses on these three motives because a Kruskal-Wallis test finds that the distribution between treatments differs significantly only for achievement motive scores (p-value < 0.01), care motive scores (p-value < 0.01), and marginally significant for affiliation motive scores (p-value $= 0.09$). The treatment with the highest effort decisions, TR high, is also the treatment with the highest ratings on achievement, affiliation and care motives. Figure 5.4 also presents results from nonparametric tests (Wilcoxon rank sum) for treatment differences in motive scores after the effort game. The most pronounced differences become apparent between TR high and TR low. We find that reported achievement, care, and affiliation motive score under TR high are significantly higher than under TR low. Moreover, TR high leads to higher achievement motivation compared to IR high and IR low at marginally significant levels.

[9]The paired test clusters at the subject level and accounts for repeated ratings that subjects make within a motive category. The test uses a generalization of the confidence interval of the Wilcoxon sign rank test.

Finally, we find that IR low leads to significantly higher ratings on the care motive than TR low. We conclude from this analysis that the degree of team synergy that is present when subjects are incentivized by team remuneration has a significant influence on the degree of achievement, affiliation and care motives of the subjects.

5.5.2 The Role of Beliefs, Motives and Social Values for Effort Decisions

In this subsection, we examine different channels that influence effort decisions with a particular emphasis on our main result: Efforts under TR high are higher than efforts under IR high. The goal of this analysis is to assess the influence of beliefs, motives and a proxy for social preferences (SVO) on our main result and to present insights into how these measures influence effort decisions differently between treatments.

Beliefs

Table 5.3 provides an insight into how effort decisions depend on beliefs. Apart from the belief variable, model 3 is identical to model 1 in Table 5.2. Beliefs are normalized by subtracting average beliefs over all treatments. We find that while incorporating beliefs diminishes the significance of the IR high and TR low treatment dummies slightly, significant treatment differences in effort provision persist. This might be driven by heterogeneous belief formation across treatments (see Table 5.7 in the appendix).[10] How beliefs affect efforts heterogeneously across treatments is presented in models 4 and 5. The two regression models divide the sample into high and low team synergy subsamples. Model 4 regresses a team remuneration dummy, beliefs normalized for the average beliefs of the high team synergy treatments, and the interaction variable between the team remuneration dummy and beliefs on effort decisions over 15 rounds for the high team synergy subsample.

[10]Table 5.7 presents an analysis of the belief formation process similar to Fischbacher and Gachter (2010).

DV: Effort decisions over 15 rounds			
Model	(3)	(4)	(5)
IR high	2.06**	-	-
	(0.91)		
TR low	-1.28**	-	-
	(0.6)		
TR high	4.66***	-	-
	(1.03)		
TR	-	2.37**	-3.27***
		(1.16)	(0.96)
Belief	0.87***	0.97***	0.49***
	(0.02)	(0.02)	(0.12)
TR x Belief	-	-0.16***	0.40***
		(0.05)	(0.12)
Constant	60.96***	74.11***	52.07***
	(0.3)	(3.23)	(0.84)
High synergy sample		X	
Low synergy sample			X
Observations	3450	1770	1680
N	230	118	112
Overall R^2	0.86	0.86	0.77

Table 5.3: The influence of beliefs on effort decisions. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; Random-effects regressions; estimated with the GLS method. Standard errors clustered at the team level in parentheses

Model 5 uses the identical list of explanatory variables, but is estimated based on the low synergy treatments subsample with beliefs normalized for the average beliefs in the low team synergy treatments. Since effort decisions in these two samples were made under different strategic incentives, it is not straightforward to compare differences in the sizes of the coefficient estimates between these two models. What is noteworthy, however, is the sign change for the coefficient estimates for the interaction terms of "TR x Belief" in the two models. Under high team synergy, an increase in beliefs about the team member's effort decision increases effort under TR significantly less than under IR. We interpret this as suggestive evidence that effort decisions under TR high are

not as strongly driven by changes in beliefs compared to IR high. A different picture emerges for the low team synergy subsample in model 6. The interaction variable of "TR x Belief" shows a positive sign in this model and is also highly significant. Therefore, under low team synergy, subjects under TR significantly increase effort more when beliefs increase. Hence, we find that the degree of team synergy influences whether beliefs under TR or IR correlate stronger with effort decisions. Overall, beliefs vary across workplace context but cannot fully account for why TR high leads to higher effort than IR high.

Motives

Next, we investigate whether motives influence effort decisions in general and how it relates to our main result in particular. We focus this analysis on the influence that motive scores measured after the team building exercise have on effort in the first round of the effort game. We restrict the analysis to effort decisions in round 1 to avoid any reciprocity or preference learning effects and thus allow for a direct link between motives and effort decisions. We find that only achievement has a significantly negative influence on effort decisions in round 1 (see Table 5.8 in the appendix). The two regression models in Table 5.4 investigate the influence of achievement motive on effort decision in round 1 for the high and low team synergy subsample, respectively. Model 6 and 7 contain a TR treatment dummy, motive scores after the team building exercise for all five motives and interaction terms between the treatment dummy and the five motive scores. In order to facilitate readability all motives and their corresponding interaction term except for achievement are omitted in the table.[11] In the high team synergy treatments, achievement motive correlates significantly positively under TR high, but significantly negatively under IR high with effort in round 1.[12] In model 7, the low team synergy subsample, we do not find any significant effect of achievement motive on effort decision in round 1 independent of the remuneration scheme.

[11]None of the motive scores or their interaction term correlate significantly with effort in round 1, except for the affiliation motive which correlates positively with effort decision in round 1 under low team synergy treatments and the selfish-Wanting motive which correlates negatively with effort decision in round 1 under the high team synergy treatments.

[12]This finding is robust to extending average effort in round 1 to round 1-5. Under this specification, the interaction effect remains weakly statistically significant and the achievement motive has a negative influence.

DV: Effort decisions in round 1		
Model	6	7
TR	-78.14	22.44
	(56.05)	(33.77)
Achievement	-9.18**	-3.13
	(3.59)	(2.42)
TR x Achievement	15.68**	-0.33
	(5.86)	(4.99)
Constant	110.5***	57.17**
	(31.66)	(23.57)
Additional motives	X	X
High synergy sample	X	
Low synergy sample		X
Observations	118	112
Overall R^2	0.22	0.11

Table 5.4: The influence of the achievement motive on effort decisions by degree of team synergy. ** $p < 0.05$; *** $p < 0.01$ OLS regression; Standard errors clustered at the team level in parentheses.

The overall negative influence of achievement on effort provision in round 1 is mainly driven by IR high. In contrast to this, under TR high, an increase in achievement motive increases effort decisions in round 1. Thus, under high team synergies the influence in the form of a significant sign change of achievement motive on effort depends on the remuneration scheme. This finding is complemented by the previous motive analysis in Figure 5.3. The team building exercise significantly increases self-reported ratings of achievement motive. As previously discussed, subjects that experience the achievement motive pursue their set goal. We interpret our results as suggestive evidence that the team building exercise and TR high align subjects' achievement goal to perform well as a team and thus cooperate more because it increases the team's performance. On the other hand, increases in achievement motivation decreases cooperation under IR high. This is evidence for a different influence of achievement motivation between contexts that could result from different goals that subjects pursue across contexts.

Social Value Orientation

Social Value Orientation (SVO) examines individual traits that influence behavior in social dilemmas Messick and McClintock (1968); Van Lange (1999). After the effort game, we elicited subjects' SVOs with a newly matched stranger as either the receiver or proposer. The Kruskal-Wallis test on the mean SVO angles does not reject the null hypothesis that the distribution across treatments is identical. Except for the SVO angle variable, model 8 in Table 5.5 is identical to model 2 above.

DV: Effort decisions over 15 rounds			
Model	(8)	(9)	(10)
IR high	12.71***	-	-
	(4.59)		
TR low	-9.98***	-	-
	(3.54)		
TR high	28.05***	-	-
	(3.61)		
TR	-	42.00***	-16.11***
		(11.49)	(5.44)
SVO Angle	0.48***	1.13***	0.20**
	(0.11)	(0.26)	(0.09)
TR x SVO Angle	-	-0.99***	0.22
		(0.35)	(0.21)
Constant	41.64***	37.01***	49.31***
	(3.1)	(8.9)	(1.42)
High synergy sample		X	
Low synergy sample			X
Observations	3450	1770	1680
N	230	118	112
Overall R^2	0.32	0.28	0.12

Table 5.5: The influence of Social Value Orientation (SVO) on effort decisions. ** $p < 0.05$; ***$p < 0.01$. Random-effects regressions; estimated with the GLS method; Standard errors clustered at the team level in parentheses

We find strong evidence that an increase in trait prosociality leads to higher effort. At the same time, the coefficient estimates and estimated standard errors for the treatment dummies of IR high, TR low and TR high remain virtually unchanged between models 2 and 8. This indicates that prosociality alone cannot explain cooperation across contexts and that other aspect of workplace context have an influence on effort provision. Model 9 and 10 in Table 5.5 present a more nuanced analysis of prosociality on effort by dividing the sample in low and high team synergy treatments. Both models regress effort over all 15 rounds on a TR treatment dummy, SVO angle, and an interaction between TR treatment and SVO angle.

In the high team synergy sample, SVO angle is positively correlated with effort decisions. The positive effect of prosociality on effort is significantly less pronounced for TR high compared to IR high, as indicated by the interaction effect. In other words, whereas under IR high more prosocial subjects cooperate significantly more, under TR high, the high degree of cooperation is not driven significantly by more prosocial individuals. This suggests that a cooperative workplace context with team remuneration and high team synergy after a team building exercise increases cooperation even for individuals that are less prosocial. Under IR high however, subjects that have a high trait prosociality cooperate significantly more, which is in line with previous findings Andersson et al. (2016). While the influence of trait prosociality on effort remains positive under TR high, it is not significant. This suggests that contextual elements can be aligned in such a way that cooperation under this context does not depend significantly on one's social trait. These findings stand in contrast to the results obtained under low team synergies shown in model 10. The effect of prosociality on effort is much weaker for both TR and IR. Moreover, we do not find any significant difference between TR and IR for the effect of prosociality on effort provision in this subsample. Our main result that effort under TR high is higher than under IR high is not driven by more prosocial individuals increasing their efforts more under team incentives. However, both, remuneration scheme and degree of team synergy are important for the extent to which prosociality influences effort which means that traits interact with contexts to influence behavior.

So far, the effects of beliefs, trait prosociality and achievement motive on effort decisions have been considered in isolation. Table 5.6 presents a regression that regresses these three variables as controls alongside the treatment dummies on

effort. We find that all three variables as well as all treatment dummies remain significant to explain effort provision. This suggests that besides the three channels that we have considered in this paper, context-dependent preferences that adapt to the workplace condition are relevant drivers for the degree of cooperation we observe between treatments. Our results indicate that workplace context can facilitate more cooperation by increasing the salience of cooperative team goals and aligning individual contextual elements.

DV: Effort decisions over 15 rounds	
Model	(11)
IR high	2.30***
	(0.85)
TR low	-1.26**
	(0.56)
TR high	5.26***
	(1.13)
Belief	0.86***
	(0.02)
SVO Angle	0.10***
	(0.03)
Achievement	-0.88***
	(0.3)
Constant	63.28***
	(1.84)
Observations	3450
N	230
Overall R^2	0.86

Table 5.6: The influence of relevant channels and treatment dummies on effort decisions. ** $p < 0.05$; *** $p < 0.01$; Random-effects regressions; estimated with the GLS method. Standard errors clustered at the team level in parentheses

5.6 Conclusion

Many aspects of workplace contexts have been neglected for the most part in economics. Economists have primarily been focused on rational behavior which do not allow for other-regarding motives or contextual factors other than monetary incentives. However, empirical evidence suggests that non-pecuniary incentives and other contextual elements significantly influence how workers behave within organizations. In particular, social relations fostered through a common team identity, achievements and communication as well as team synergies (i.e. a complementarity in production between workers) shape the context and influence workers' effort decisions. As a result, workplace context shapes beliefs, motivations as well as how prosocial traits affect decisions.

Our experiment is designed to test how a workplace context with different remuneration schemes and team synergies influence effort after a team building exercise that promotes a common team identity. We find that on average team remuneration, despite the free-rider problem, results in higher effort than individual remuneration when team synergy is high. We further find that effort in all treatments is significantly higher than Nash equilibrium predictions. We interpret this finding that our team building exercise increases team identity independent of the degree of team synergy or remuneration scheme.

Our results suggest that preferences at the workplace are context sensitive. Most importantly, a cooperative workplace context includes not only reward interdependencies but also social and task interdependencies. Our results further suggest that when workplace context elements are unambiguously aligned towards a cooperative end, subjects do not have to rely as much on belief-based inferences. Similarly for prosocial preferences, when contextual elements are cooperatively aligned, it is unambiguous that own behavior should be directed towards group ends irrespective of one's own trait-based behavioral tendencies towards strangers. One possible explanation is given by the influence of the achievement motive. More achievement motivated subjects cooperate more under cooperative contexts but less under individual contexts. Achievement motivated subjects may pursue different goals depending on context. For example, under team remuneration the team's performance is more salient whereas under individual remuneration the individual performance is more salient. This interpretation should be seen in the light of team identity. Team identity enables subjects to think more in terms of team goals than under in-

dividual remuneration in certain contexts. In this sense, the concept of "we thinking" (Akerlof, 2016) can be interpreted through the lens of motives. Once subjects focus on team goals it is straightforward to assume that the need to achieve an individual goal diminishes.

Different contextual elements at the workplace interact to influence the effort provision decision of workers. These interaction effects at the workplace determine how a specific situation is perceived by the worker and change objective goals and motivations. Hence, contextual elements should be carefully designed within organization, taking into account potential interactions. The workplace culture should be as clear as possible and point towards a common direction, leaving no room for ambiguities due to contextual misalignment.

5.7 Appendix C

5.7.1 C1. Additional Regression Results

Belief formation

DV: Belief about team member's effort decisions	
Model	(C1)
IR high	1.18***
	(0.44)
TR low	-0.66*
	(0.4)
TR high	1.38***
	(0.45)
Round	-0.12**
	(0.05)
Effort team member (t-1)	0.53***
	(0.02)
Belief (t-1)	0.42***
	(0.03)
Constant	3.63***
	(0.66)
Observations	3220
N	230
Overall R^2	0.91

Table 5.7: Belief formation. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ Random-effects regressions on the individual subject over 14 rounds (round 2 to round 15) of the effort game; estimated with the GLS method. Standard errors clustered at the team level in parentheses.

By means of a GLS random effects regression model we find that the guess about the team members' effort choice over the course of the effort game is significantly influenced by the treatments in the effort game. TR high and IR high increase held beliefs significantly at the below 1% significance level while TR low decreases beliefs marginally significantly at the below 10% level, all relative to the IR low treatment. These findings are robust to integrating a count variable for the round of the game, the effort decision of the team member

in the previous round and the own belief in the previous round. We conclude from this that the context of the effort game determined by the treatments affects belief formation significantly, or: beliefs are context dependent.

Motive Scores on Effort

Model C2 in Table 5.8 regresses the five motives measured after the team building exercise and treatment dummies on effort decisions in round 1. Note that the treatment dummy coefficients differ in size and significance compared to model 1 and 2 in Table 5.2. However, observation sample and estimation method differ between tables. Therefore, to conclude that motive scores after the team building exercise explain treatment differences on effort over all rounds is not possible. Achievement motive has a significant negative effect on effort. This holds true even when we leave out any motive besides achievement (model C3). We want to point out, however, that absence of further evidence of the influence of (other) motives on effort does not prove that it does not exist. Our motive elicitation method by means of motive specific word clusters may be an imprecise measure for motives. Moreover, we find highly significant correlations between our different motive measures.[13] Achievement motive measures after the team building and after the effort game are highly significantly positive correlated with every other motive category. The presentation of both models- B2 and B3- can therefore be seen as a robustness check of the achievement influence despite this collinearity between motives.

[13]Correlation coefficients between achievement motive and other motives after the team building exercise (significance of correlation coefficient in parentheses): $\rho_{achievement,affiliation} = 0.18$ ($p<0.01$); $\rho_{achievement,care} = 0.24$ ($p<0.01$); $\rho_{achievement,power} = 0.27$ ($p<0.01$); $\rho_{achievement,wanting} = 0.17$ ($p<0.05$). Correlation coefficients between achievement motive and other motives after effort game (significance of correlation coefficient in parentheses): $\rho_{achievement,affiliation} = 0.33$ ($p<0.01$); $\rho_{achievement,care} = 0.27$ ($p<0.01$); $\rho_{achievement,power} = 0.33$ ($p<0.01$); $\rho_{achievement,wanting} = 0.27$ ($p<0.01$).

DV: Effort decision in round 1		
Model	(C2)	(C3)
IR high	3.77	3.5
	(4.91)	(4.89)
TR low	-7.80*	-8.30*
	(4.68)	(4.38)
TR high	20.55***	20.10***
	(4.23)	(4.26)
Achievement	-3.76**	-3.81**
	(1.69)	(1.53)
Affiliation	1.4	-
	(2.15)	
Care	-1.26	-
	(2.55)	
Power	0.97	-
	(1.88)	
Selfish-Wanting	-1.17	-
	(1.25)	
Constant	78.11***	77.58***
	(14.53)	(12.7)
N	230	230
Overall R^2	0.16	0.16

Table 5.8: The influence of motive scores on effort. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ OLS regressions on individual effort decisions in round 1of the effort game. Standard errors clustered at the team level in parentheses

5.7.2 C2. Overview of Workplace Relevant Motives

Motive & Definition	Associated goal & behavioral tendencies	Words associated with motive (questionnaire words)	Importance for the workplace
Achievement			
Achieve something better or more efficient than previously	Compete with a standard of excellence, ambitious, persistent or dominant actions	Hard-working, productive, success-driven	Aspiration levels, pursuing subjective goals and targets
Affiliation			
Need to be liked or belong to a group	Form and maintain cooperative alliances, norm-adherence and norm compliance	Attached, affable, popular	Productive teams of friends and allies, conform to norms within teams
Care			
Wanting to be accepted and to accept and nourish others, behave altruistically	Helping, generosity, and cooperation	Helpful, supportive, unselfish	Caring for well-being of one's team.
Power-Status			
Desire to have an impact, to be strong, and to influence others, be better than others	Gain and maintain social status; control over environment, competitive, reputation concerns	Officious, firm, stifling	Increased reward sensitivity, and risk taking, performance dependent on others
Selfish-wanting/consumption			
Maximization of own self-interests and consumption, protect and focus on own well-being	Pursue subjectively-defined ends optimally, wanting and desire goods and services	Consumerist, materialistic[14]	Selfish behavior without considering others

Table 5.9: Overview of workplace relevant motives

5.7.3 C3. Instructions

Welcome to today's study. During this study you will work on different tasks in different parts. Within these parts, you will make decisions which have financial consequences for you and other participants. Your decisions in the single parts result in points. These points are converted to Euros at the end of the study. You receive €1 for 250 points. In addition to your payoffs from the single parts, you receive a fixed amount for your participation in today's study (show-up fee) of 600 points. The show-up fee as well as these parts of the study, for which you earn a flat and fixed amount if you complete the part properly ensure, that in any case, you will receive a positive amount at the end of the study. You are informed about how exactly your decisions are remunerated with points in the instructions for the single parts. We will distribute the instructions for the single parts separately and read them out loud. Please read along while the instructions are being read out to you. Please do not talk to other participants. If you have a question, please raise your hand quietly. A scientific assistant will come to you and answer your question in private. The identities of the individual participants will not be revealed during today's study.

Motives

In this part you indicate, how much you feel yourself driven by different feelings and motivations just now or rather how strong you currently perceive them. These motivations will be displayed to you as a word on the screen and you have to indicate for every word on a 7-point scale how much you feel yourself driven by this feeling or motivation. You receive 180 points for your work on this part when you have carefully indicated your perception for every word on the scale at the end of the study. Please look at the screen now and start with this part as soon as it is displayed to you.

Picture puzzle within Teams

In this part you build a team with another participant in this room. The teams have been randomly assigned before the beginning of this part. Within your team you will jointly work on three picture puzzles. In doing so you

have to find differences in two almost identical pictures for every picture puzzle within your team. During this task you can communicate with your team member via a chat window and exchange about found mistakes or organize your work.
Initially, one picture pair will be displayed to you on the screen per picture puzzle. At first, you have 3 minutes to count the differences between the two pictures. As soon as you see a picture pair, your time is running. Meanwhile you have the possibility to communicate with your team member by chat. After the three minutes, only the left picture of the picture pair will be displayed to you for additional 60 seconds. In this time, you can still communicate with your team member by chat and compare the amount of mistakes found. Subsequently, you and your team member each separately enter into a box on the screen how many differences you have found. For every mistake found, you get 25 points. However, you only get points for found differences in a picture pair if:

- You and your team member enter an identical amount into the box. Should you and your team member not enter an identical amount of differences, you and your team member receive nothing; irrespective of how many differences you have entered individually.
- You and your team member state a number which is smaller or equal the amount of differences that the respective picture puzzle actually contains. Thus, you receive no points if a number is stated that is higher than the actual amount of differences.

An overview about your decisions and those of your team member, as well as the resulting payoffs from the picture puzzle takes place at the end of the study.

Example:

- You state that you have found 5 differences in the first picture pair. Your team member states that she found 6 differences. Both of you do not receive any points for this first picture pair.
- You state that you have found x differences in the second picture pair. Here, your team member also states that she found x differences. In fact,

the second picture puzzle only has x-1 differences. Both of you receive no points for this second picture pair. You state that you have found 10 differences in the third picture pair. Your team member also states that she has found 10 differences. In fact, there are 10 or more differences between the two pictures in the third picture puzzle. You and your team member respectively receive 250 points for the third picture puzzle.

- In this example you would receive 250 points for the entire picture puzzle part at the end of the study. These result from the sum of the scored points from the three picture puzzles. Puzzle 1 = 0 points; puzzle 2 = 0 points; puzzle 3 = 250 points; puzzle 1 + 2 + 3 = 250 points.

Instruction for the Chat Feature:

The chat is situated in the left part of the screen. In the bottom-left, blue-highlighted window you can write your message to your team member and send it by pushing "Enter". The written messages of both team members appear in the window above. Messages from you are marked with the adding "You". Messages from your team member are marked with the adding "Your team member". The chat is thought of as a tool, which shall support you in your joint work on the picture puzzles. For instance, you can write down and send notes about found differences here. The history of all sent messages is visible in the chat window at all times.

Decision Situation

In this part of the study, you collaborate with the identical team member, you have already collaborated with in the picture puzzle part. You work together with this identical team member in this part over 15 rounds. Per round, you will make one decision and will state one belief about the behavior of your team member. How many points you get in this part depends on your decisions and beliefs as well as the decisions of your team member.

The decision you make each round:

In each of the 15 rounds, you and your team member respectively choose an integer between 0 and 105. The chosen integer is your decision in this round.

Enter this decision into the box on the screen. Your payoff will depend on the number you chose and the one which your team member chose.

(IR low; IR high with larger synergy parameter of 9 analogously)
Production:
The decisions that you and your team member make, determine your respective production. This is composed as follows:
Your production =10 x (Your decision) + 1 x (decision of team member)
Production of your team member = 10 x (decision of team member) + 1 x (your decision)
However, also costs are connected to the number that you selected as your decision.

Costs:

Your costs and the costs of your team member for possible decisions are: Your costs = 0.1 x (Your decision)^2
Costs of your team member = 0.1 x (decision of team member)^2
You alone bear the costs of your decision. Note, that costs are increasing quadratically if you decide for higher numbers. This means that if you choose a smaller number, you only bear little cost. However, if you decide for a large number, costs grow disproportionately and you bear very high costs.

Example: (Full particulars in cost table)
If you decide to select 10 as your decision, you bear costs to the amount of 10. However, if you decide to select 100 as your decision, you bear costs to the amount of 1000. Hence, it is possible to make losses resulting from high costs, and accordingly receive a suboptimal amount of points because of a decision that was too high.

Points:
The points from your decision result from the difference between your production and your costs. Your points are:
Your points = Your production - your costs
This can be depicted as follows:
Your points = 10 x (Your decision) + 1 x (decision of team member) - 0.1 x

(Your decision)^2

(TR low; TR high with larger synergy parameter of 9 analogously)
Production:
The decisions that you and your team member make, determine your production. This is composed as follows:
Your production = 10 x (Your decision) + 1 x (decision of team member)
Production of your team member = 10 x (decision of team member) + 1 x (your decision)
Your joint team production is the sum of your production and the production of your team member. This can be expressed in a simplified way:
Team production = 11 x (your decision + decision of team member)
However, also costs are connected to the number that you selected as your decision.

Costs:
Your costs and the costs of your team member for possible decisions are:
Your costs = 0.1 x (Your decision)^2
Costs of your team member = 0.1 x (decision of team member)^2
You alone bear the costs of your decision. Note, that costs are increasing quadratically if you decide for higher numbers. This means that if you choose a smaller number, you only bear little cost. However, if you decide for a large number, costs grow disproportionately and you bear very high costs.
Example: (Full particulars in cost table)
If you decide to select 10 as your decision, you bear costs to the amount of 10. However, if you decide to select 100 as your decision, you bear costs to the amount of 1000. Hence, it is possible to make losses resulting from high costs, and accordingly receive a suboptimal amount of points because of a decision that was too high.

Points:
The points from your decision result from the difference between your share of the joint team production and your own costs. Your points are:
Your points = 0.5 x (team production) - your costs
This can be depicted as follows:
Your points = 5.5 x (Your decision + decision of team member) - 0.1 x (Your

decision)[2]

The belief you state per round:
Directly after you made your decision in every round, you state a belief about the decision that your team member made in this round. For that purpose, you enter your belief as an integer between 0 and 105 in the box on the screen. If the belief about the previous decision of your team member does not deviate more than 10 units from her actual decision, you receive in this part an additional bonus of 150 points. Otherwise, you receive no bonus for your belief.
One round and therefore one decision as well as the decision of your team member in this round will be randomly chosen at the end of the study to determine your points from this part. In addition, a different round is randomly selected for the possible bonus payment from the belief statement about the decision of the team member.

Comprehension Check
Before you begin to make decisions in the decision situation described above, we would like to probe your comprehension of it. For this purpose, please answer the two practice questions on the screen. The instructions to this will be displayed to you on the screen. After your answered the comprehension questions, you will make your decisions within the decision situation described above.

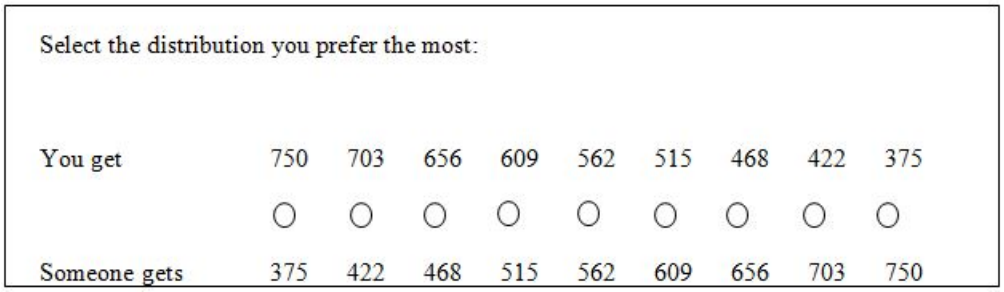
Distribution Task

In this part of the study you work on six distribution decisions. For this purpose, you build a group of two with another participant in this room. The group assignment was carried out randomly before the beginning of this part of the study. The identities will stay anonymous for the two of you respectively. The random group assignment in this part ensures, that in no case you will be matched with a participant into the group of two who was your team member in previous parts of the study.
In the six short tasks you will make decisions how you distribute certain amounts of points between yourself and the other person. To this end you choose for every task the one of nine given distributions that you prefer. One of these six tasks will be randomly selected to determine your as well as the

payoff of the other person in the group from this part. In this randomly selected task it will also be randomly determined, if your preferred distribution or the preferred distribution of the other participant in the group is selected to specify your payoffs from this part.

Example:

Select the distribution you prefer the most: Please look at the screen now. As



Select the distribution you prefer the most:									
You get	750	703	656	609	562	515	468	422	375
	○	○	○	○	○	○	○	○	○
Someone gets	375	422	468	515	562	609	656	703	750

soon as the program was started, please indicate your decisions which payoff alternative you prefer for each task.

Cost table

Your decision	Costs of this decision	Your decision	Costs of this decision
0	0,0	53	280,9
1	0,1	54	291,6
2	0,4	55	302,5
3	0,9	56	313,6
4	1,6	57	324,9
5	2,5	58	336,4
6	3,6	59	348,1
7	4,9	60	360
8	6,4	61	372,1
9	8,1	62	384,4
10	10	63	396,9
11	12,1	64	409,6
12	14,4	65	422,5
13	16,9	66	435,6
14	19,6	67	448,9
15	22,5	68	462,4
16	25,6	69	476,1
17	28,9	70	490
18	32,4	71	504,1
19	36,1	72	518,4
20	40	73	532,9
21	44,1	74	547,6
22	48,4	75	562,5
23	52,9	76	577,6
24	57,6	77	592,9
25	62,5	78	608,4
26	67,6	79	624,1
27	72,9	80	640
28	78,4	81	656,1
29	84,1	82	672,4
30	90	83	688,9
31	96,1	84	705,6
32	102,4	85	722,5
33	108,9	86	739,6
34	115,6	87	756,9
35	122,5	88	774,4
36	129,6	89	792,1
37	136,9	90	810
38	144,4	91	828,1
39	152,1	92	846,4
40	160	93	864,9
41	168,1	94	883,6
42	176,4	95	902,5
43	184,9	96	921,6
44	193,6	97	940,9
45	202,5	98	960,4
46	211,6	99	980,1
47	220,9	100	1000
48	230,4	101	1020,1
49	240,1	102	1040,4
50	250	103	1060,9
51	260,1	104	1081,6
52	270,4	105	1102,5

5.7.4 C4. Screenshots of Experimental Procedure

Figure 5.5: Motive elicitation screens

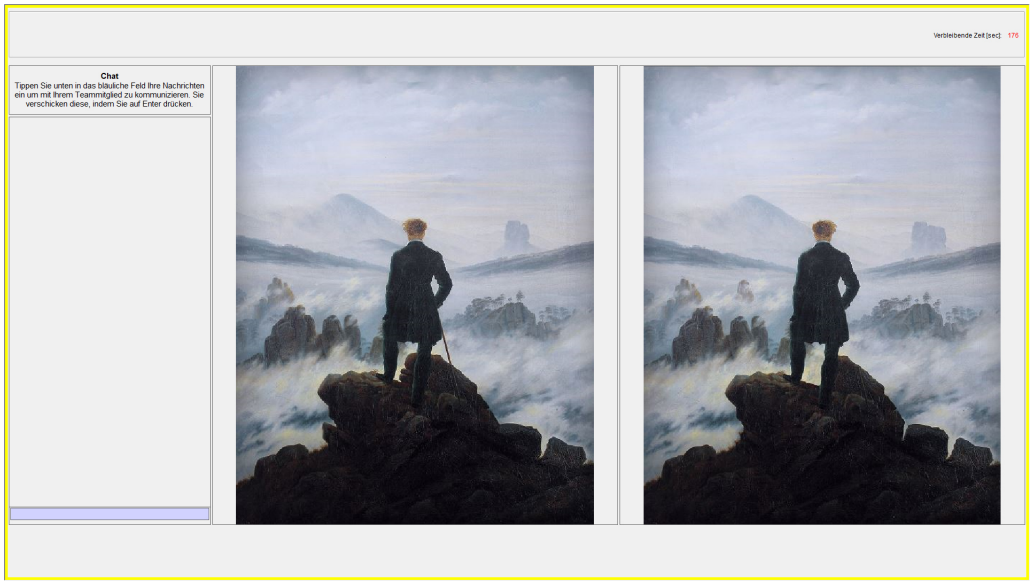


Figure 5.6: Team building screen 1 (one of three picture pairs)

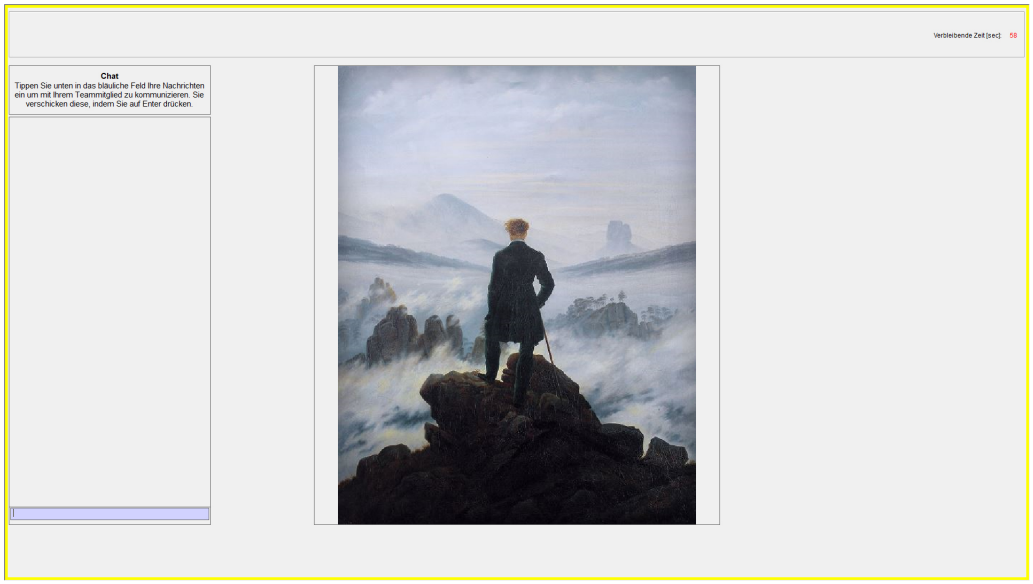


Figure 5.7: Team building screen 2 (one of three picture pairs)

Figure 5.8: Team building screen 3 (one of three picture pairs)

Figure 5.9: Questions after team building exercise

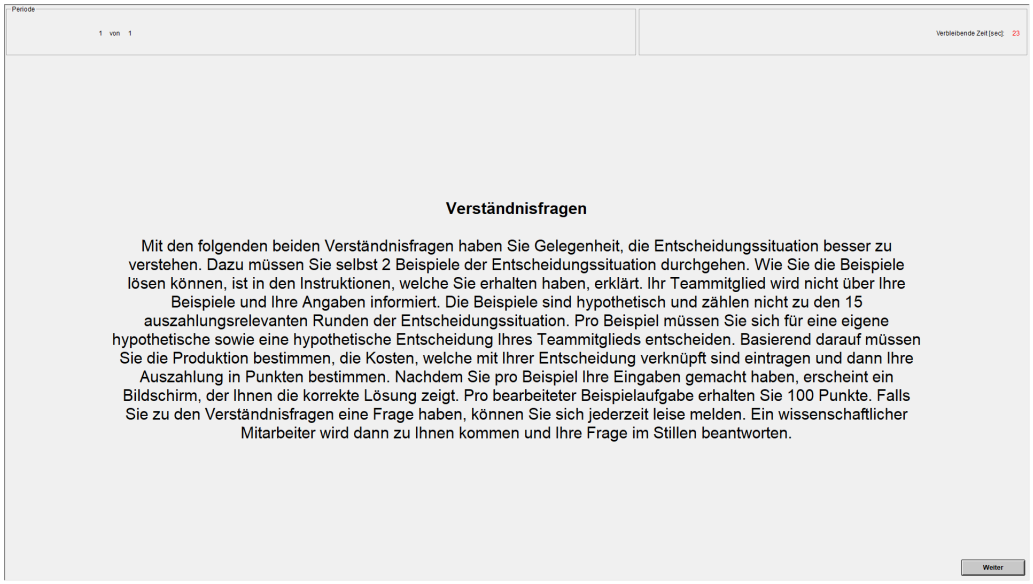


Figure 5.10: Comprehension and exercises 1

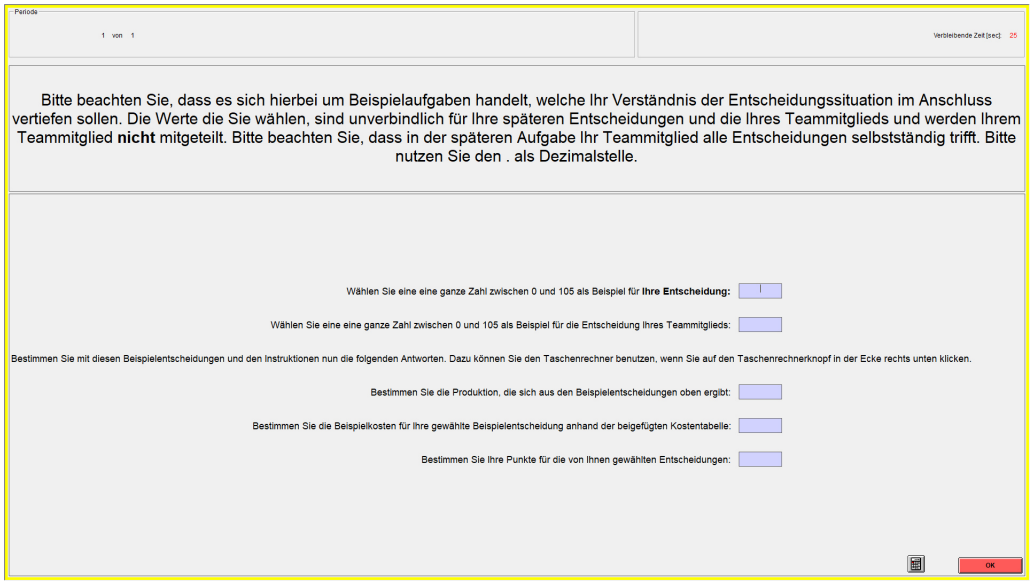


Figure 5.11: Comprehension and exercises 2

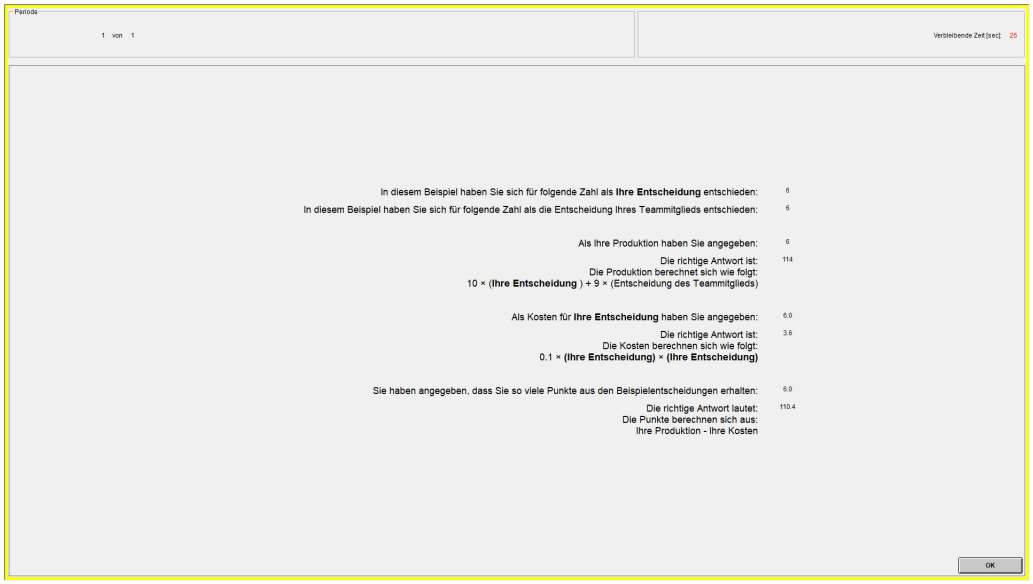


Figure 5.12: Comprehension and exercises 3

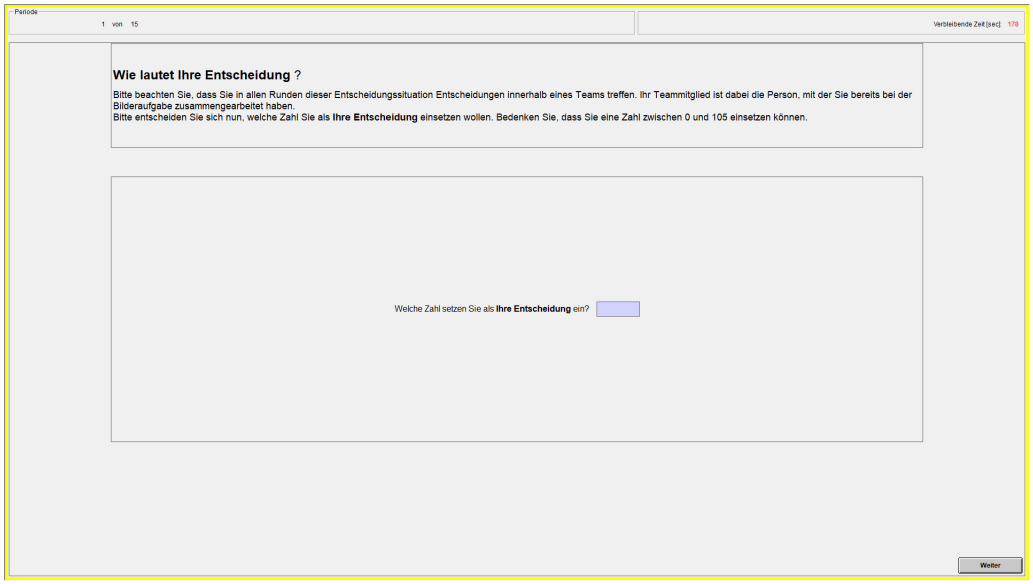


Figure 5.13: Effort game 1: Effort decision

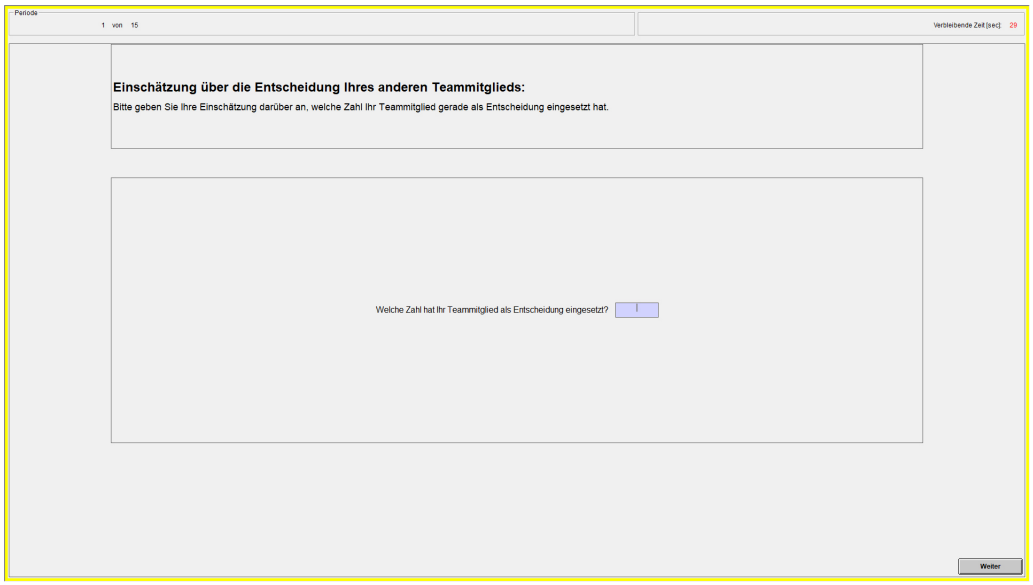


Figure 5.14: Effort game 2: Belief elicitation

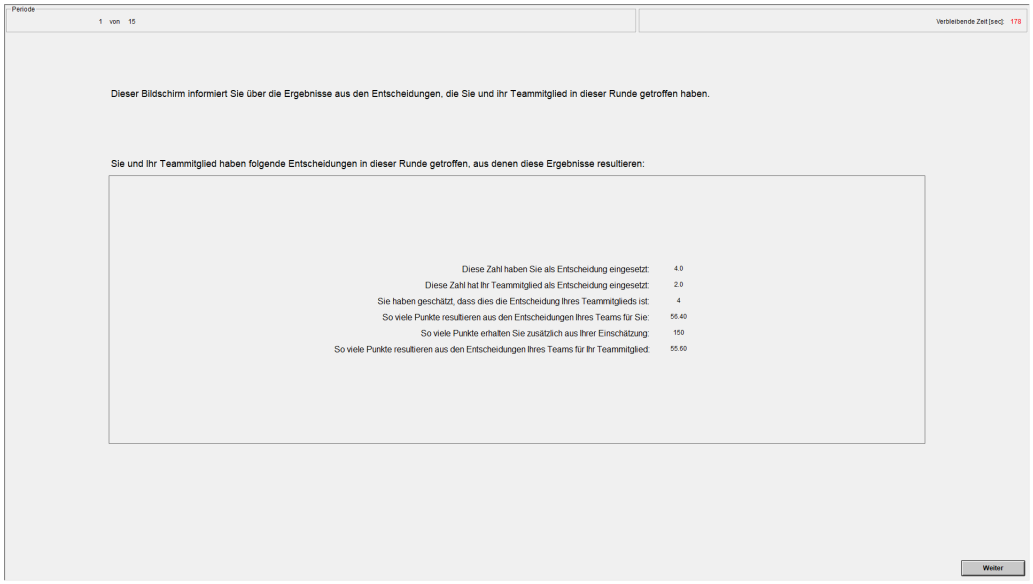


Figure 5.15: Effort game 3: Information about previous round

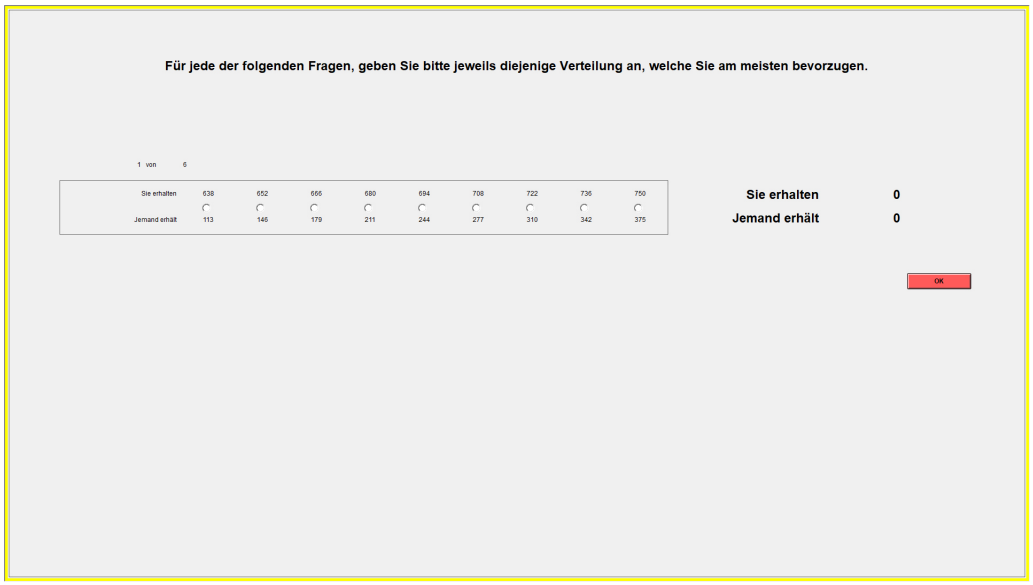


Figure 5.16: SVO screen 1

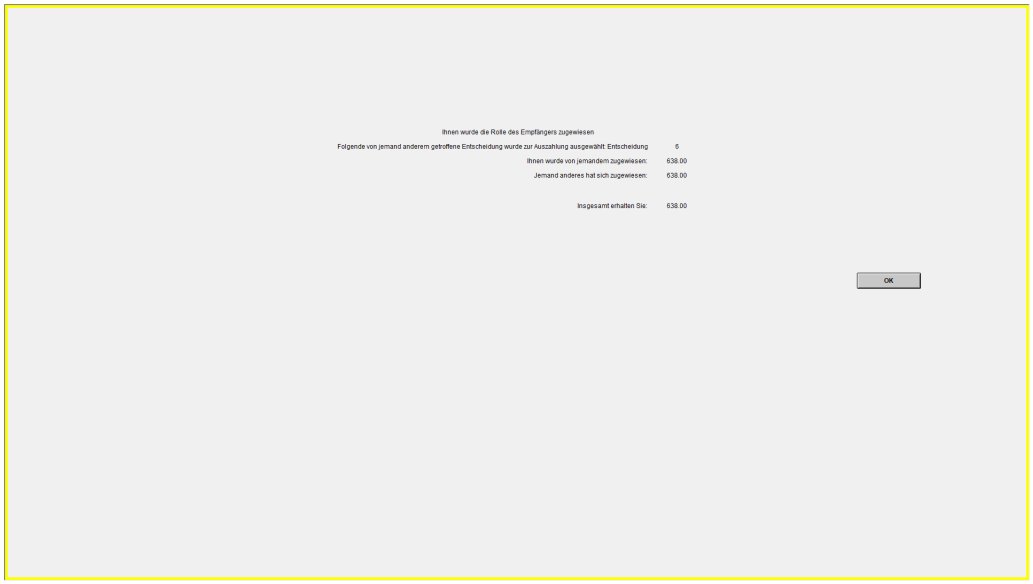


Figure 5.17: SVO screen 2

Figure 5.18: Final payoff screen 1

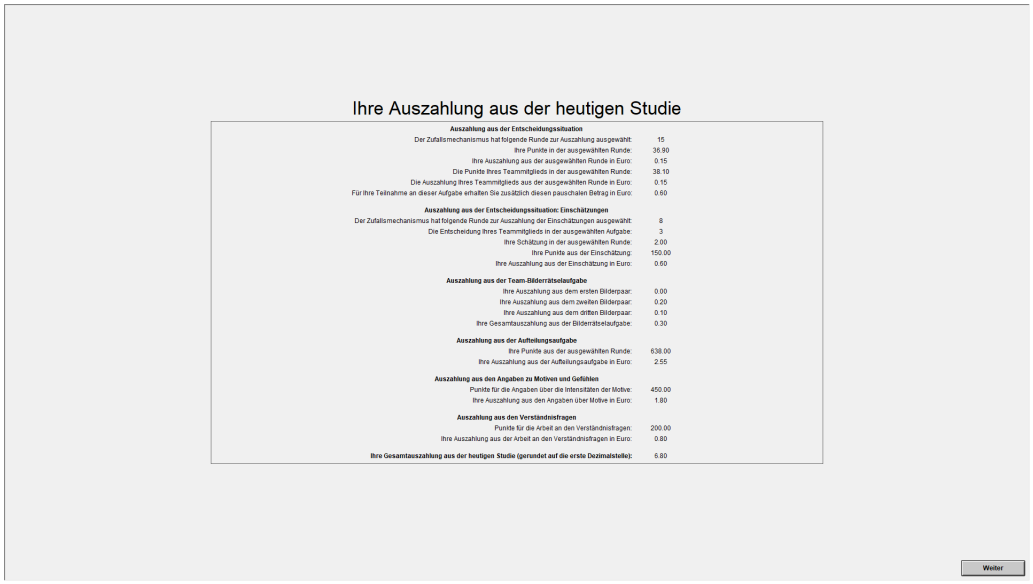


Figure 5.19: Final payoff screen 2

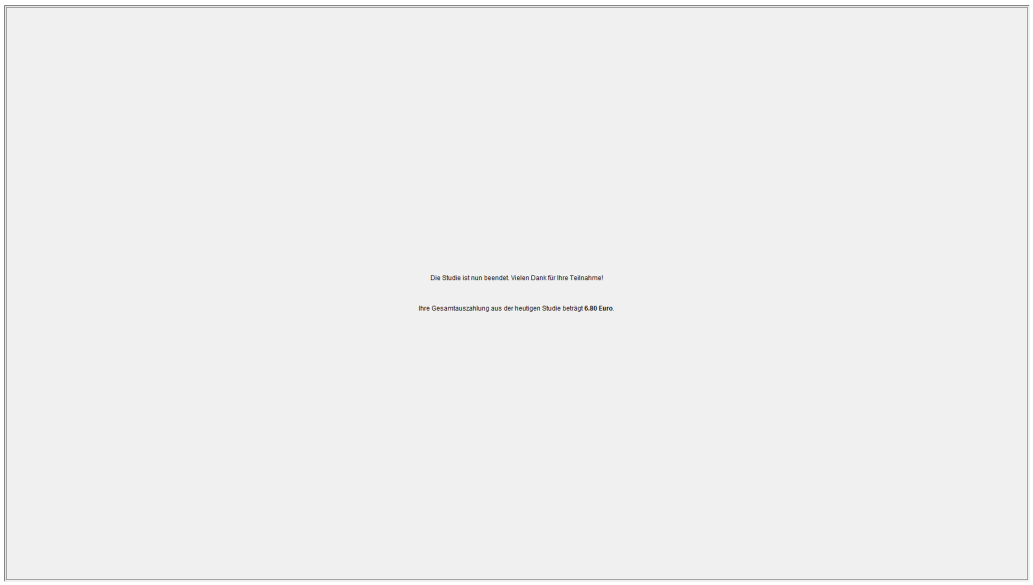


Figure 5.20: Final screen

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